The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Notes and Comments

Chance and Hunt Centenary

"TALL oaks from little acorns grow" might well have been written across the portals of Imperial Chemical House on Thursday in last week, when representatives of the heavy chemical industry from all the principal producing countries of the Continent joined with the Home Secretary and leaders of industry in this country to celebrate the centenary of Chance and Hunt, Ltd. We doubt whether so distinguished an assembly would have gathered to congratulate the firm if it had not been a subsidiary of Imperial Chemical Industries, Ltd., but be that as it may, the impression uppermost in the minds of all the guests as they dispersed after singing "Auld Lang Syne" was that rationalisation had not destroyed individuality, and that the personal touch was still the foundation of all true greatness in the industrial world. As Sir Harry McGowan reminded us, Imperial Chemical Industries, Ltd., is a parent company with some 120 subsidiary and sub-subsidiary companies, so that it would not be difficult to lose the identity of some of the undertakings that have been absorbed in the past decade. In the case of Chance and Hunt, Ltd., however, the industry still recalls with gratitude the services rendered by Alexander Chance and Edwin Hunt, nor is it unmindful of the fact that several of their direct descendants are still carrying on the traditions that were originally established in those little factories at Oldbury and Wednesbury in the early part of the nineteenth century. For national purposes, men in the chemical industry have to work together and help one another if their efforts are to have the most efficient results; no one realised that fact more than the founders of Chance and Hunt, Ltd.

It was a hundred years ago that Chance Brothers started an alkali works at Oldbury, and it was Mr. Alexander Chance, one of the partners, who discovered the Chance process for treating alkali waste. In 1851 William Hunt opened an alkali works at Wednesbury, which was amalgamated with Chance Brothers in 1898. Eleven years later the company acquired the Cardiff Alkali Co., Ltd., and in 1911 the sulphuric acid works of James Gibbs and Finch, Ltd., of Cwmbran, and the businesses of Peyton and Son and Shorthouse and Sons, of Birmingham. In 1917 a controlling interest in Chance and Hunt, Ltd., was acquired by Brunner, Mond and Co., which, in turn, became a part of Imperial Chemical Industries, Ltd., at the time of the great amalgamation, in 1926. In proposing the toast of the company, Mr. Kenneth Wilson disclosed some intimate details regarding the humble origin of the firm at Oldbury, with a plant costing only £500. As the head of a neighbouring firm which, according to his own remarks at the dinner seems to have reaped considerable advantage from Chance and Hunt's willingness to co-operate, he paid a warm tribute to the public spirit which characterised the lives of those who, in the days of infancy of the chemical industry, established a concern which to-day holds a coveted position in the world of chemical manufacture. May Chance and Hunt, Ltd., long continue to flourish.

Fine Chemical Manufacturers and Key Industry Duties

THE Key Industry Duties are due to expire next August, and the fine chemical group of the Association of British Chemical Manufacturers has therefore been engaged for a long time in collecting production statistics and in investigating the reasons for the importation of all fine chemicals brought into this country in excess of £1,000 in value in any recent year. The data thus collected proved of the greatest utility when, a few months ago, the Government appointed its committee to review the duties, and the Association was asked to submit a report on the progress of the industry since the duties were imposed in 1921, and its views in regard to the future. A voluminous memorandum, supported by detailed statistical appendices, was submitted, and the facts which it contained amply justified the contention that the British fine chemical makers have made full use of the Key Industry Duties in the national interests and have built up a strong and progressive industry. The memorandum also showed that the fine chemical industry is still a key industry of vital importance to national security, both in peace and in war. Stress was laid on the fact that the strength of the industry, which covers several thousand different products, lies in its totality rather than in its numerous constituent parts; further, that the industry is never static, but is continually developing with the introduction of new products. The unsettled nature of the world's economic systems makes it essential that the industry should continue to be safeguarded by means of a minimum duty of $33\frac{1}{3}$ per cent. *ad valorem*. After examining the underlying principles of the Key Industry Duties and of the Import Duties Act, the memorandum concluded with a recommendation that the future development of the industry in the national

interest as a cohesive whole would be assured with greater security and certainty by a continuation of the Safeguarding of Industries Act than by merging the Key Industry Duties on fine chemicals in the Import Duties Act. The fine chemical group reached this conclusion after a careful examination of the merits and de-merits of both Acts.

Evidence in support of the Association's case was given before the committee by Mr. J. Davidson Pratt, general manager, at the end of July, and at its conclusion he was asked to submit a further memorandum indicating the safeguards which would be essential in the opinion of the Association, should it be ultimately decided to transfer the Key Industry Duties to the Import Duties Act. Mr. Wallace announced at the recent annual meeting of the Association that a supplementary memorandum had since been submitted to the Key Industries Committee setting out reasons why the fine chemical makers considered that the progressive development of the industry would be better assured by a continuance of the Key Industries Duties rather than by a transfer to the Import Duties Act.

Welding Chemical Vessels

A SUBJECT of the utmost importance was discussed by the Institution of Chemical Engineers on October 9, when Mr. C. H. Davy read a paper on "Modern Methods of Welding," an account of which was given in THE CHEMICAL AGE last week. Although the practice of welding is of ancient origin, its real technical development has been recent. It is not many years since the sight of thermite welding of tramway rails *in situ* was common. To-day no engineering works of any consequence can exist without its welding plant. In spite of the optimism expressed by the authors and their audience, not everyone is yet fully convinced of the efficacy and reliability of welded work. For example, even for moderate pressures welded steam boilers have not yet come into favour—and we believe that that is due (we are open to correction) to the boiler insurance companies. Nevertheless the chemical industry is fully prepared to make use of welded vessels to withstand the highest pressures—indeed, there would be no small difficulty in conceiving of a bolted or riveted vessel with walls perhaps 5 in. thick. The development of welding has been, therefore, one of the more important factors that have made possible modern high-pressure chemistry.

The paper, whilst showing clearly what has been accomplished, also discloses the difficulties of the process. The ideal welded joint would be a connecting metal of the same composition and structure as the plates to be joined and with its edges ill-defined by reason of being composed of material intergrown with the parent metal. By whatever process the weld is made, the essential difficulties of securing any such result when the weld metal is to be fused and so subjected to a totally different heat treatment from that of the plates, must be obvious. No very well-defined agreement seems to have been reached as to the need for further heat-treament to remove strains, and some research might with advantage be undertaken. A word of warning is necessary—welding in an engineering works is very different from welding *in situ*.

Chemical Transport by Road

WE gather from the annual report of the Association of British Chemical Manufacturers that a discussion between the Home Office authorities and representatives of the Association is expected to take place in the near future, prior to the issue of amended Orders relating to road transport. Last December the Home Office sent to the Association provisional draft Orders covering the conveyance by road of inflammable liquids (other than petroleum spirit), corrosive acids, etc. The formal Order will govern the type and the specification of the packages to be used; the method of stowage; labelling; the construction of mechanically propelled vehicles, including tank wagons; the height of sides and ends of wagon bodies; maximum quantities per container and load; ullages; the number of persons to accompany load; and the responsibility of senders, which will probably include the onus of assuring that vehicles hired by them comply with the requirements of the Order. The views of members of the Association, as submitted to the traffic committee, received careful consideration, and a memorandum recommending modifications to the draft Orders was compiled and sent to the Chief Inspector of Explosives. The traffic committee considered the provisional proposals of the Poisons Board in so far as they concerned transport, and decided to recommend the deletion of the rules for transport, and important modifications of the proposed labelling for traffic passing in bulk between makers' works and in certain types of containers. The committee met the railway companies' representatives, and as a result the secretary of the Railway Clearing House wrote to the Poisons Board a letter supporting the views of the committee. The transport provisions in the revised draft rules recommended by the Poisons Board are considered reasonable, but the committee is not satisfied with the labelling proposals; suitable modifications have been included in the Association's memorandum to the Home Office.

Oil from Coal

Big Development Plan for Scotland

SIR GODFREY COLLINS, Secretary for Scotland, in a speech at Duns, Berwickshire, on October 18, said that for some time past several Scottish business men had been working quietly with the idea of extracting every product of value from coal without waste, and large amounts had been spent on research work. A company with an influential backing was being formed to take over works near Glasgow.

The works included blast furnaces with the necessary equipment and accessories, facilities for the manufacture of oil, pig-iron, tar and cement, and an electric generating station for supplying all the power required. The concern would develop very large coal and iron ore deposits in Lanarkshire, and the production of oil from coal would be an important part of the business.

The works were ready to start as soon as arrangements had been completed, and they would find employment for a large number of men, starting with about 750 men and gradually increasing. This should start a new era in coal and oil industrial development in Scotland.

Centenary of Chance and Hunt, Ltd.

Sir John Simon's Speech at the Celebration Dinner

Sir Harry McGowan, chairman and managing director of Imperial Chemical Industries, Ltd., who presided at the centenary dinner.

THE hundredth anniversary of the founding of Chance and Hunt, Ltd., which has been, since 1927, a subsidiary of Imperial Chemical Industries, Ltd., was celebrated at a dinner given by Sir Harry McGowan and the directors in the refectory at Imperial Chemical House, Millbank, on October 17. Sir Harry McGowan presided over a gathering which was in a unique sense representative of the heavy chemical industry both of this country and of the Continent. The principal guest was Sir John Simon, the Home Secretary, and other representatives of the Government and Government departments present were Sir Percy Ashley, of the Import Duties Advisory Committee, Mr. E. S. Burtenshaw (Customs House), Mr. W. A. Damon (chief alkali inspector) and Sir Robert Robertson (Government chemist). The Continental heavy chemical industry was represented by Dr. E. Webei Andreae, director of I. G. Farbenindustrie, Herren C. A. Clemm (Wirtschafts Gruppe Chemie), Emil A. Fester (Sulfat Vereinigung G.M.B.H.), K. von Heider (I. G. Farbenindustrie), C. H. Hammargren (director, Winterschall A.G. Berlin), P. Haeflieger (chairman, I. G. Frankfurt), Dr. Paul Müller (Dynamit A.G., Cologne), Hermann Winkler (Metallgesellschaft) and Dr. Heinz Rossterg (managing director, Winterschall A.G., Berlin); Messieurs Raymond Berr (Compagnie Nationale des Materies Colorantes Etablissements Kuhlmann, Paris), Pierre Charignon (direction commerciale des produits chimiques de la Cie de St. Gobain, Paris), Robert Hubon (Kuhlmann, Paris), Henri Lesage (St. Gobain), Felix Lavaste (chief engineer of mines, St. Gobain), Henri Maingot (Paris), Corneille Brouwers (director of Union Chemique Belge, Brussels), A. Bogaerts (Brussels), Dr. Frederik Jahn (Svenska Papporbrukens Handels A-B, Stockholm), Mr. Anders Norloff (Paus and Paus A-S, Oslo) and Consul L. C. Smith (Trondheim). Representatives of societies and institutions included Professor J. F. Thorpe, F.R.S. (president of the Institute of Chemistry), Mr. W. A. S. Calder (president of the Society of Chemical Industry), Mr. J. Davidson Pratt (secretary of the Association of British Chemical Manufacturers), Mr. R. G. Perry (chairman of the National Sulphuric Acid Association), Mr. W. Garrod Thomas (general manager of the National Sulphuric Acid Association) and Mr. Guy Locock (director, Federation of British Industries). Other principal guests were Viscount Leverhulme, Sir Walrond Sinclair, Lord Trent, Sir David Milne Watson, Mr. Emile Mond, Mr. C. R. Brotherton, Dr. F. L. Pyman, Mr. L. P. O'Brien, Sir Robert Mond, Dr. W. F. Zimmerli, Dr. Herbert Levinstein, Major Crossley, Mr. C. A. Hill, Mr. E. V. Evans, Mr. Norman N. Holden, Mr. D. J. W. Orr, Capt. D. S Peploe, Dr. Everest, Mr. J. R. Lane, Dr. W. H. Coates, Mr. Holbrooke Gaskell, Lord Melchett, Mr. J. G. Nicholson and Mr. J. H. Wadsworth.

Modern Growth of Chemical Industry

Sir JOHN SIMON proposed the toast of "British Chemical Industry," and said that industrial chemistry provided the best illustration of the prolific and healthy progeny which could be derived from the marriage of pure science to commercial enterprise. No thoughtful and interested man who considered as a layman and as an outsider the progress of industrial chemistry could fail to be struck by the most remarkable contrast between that development and the progress of mechanical science. The application of mechanical science to practical ends had been a progress through the ages—the wheel, the screw, the lever and all the developments that had followed afforded a splendid story, but it was a long one. One of the most surprising things about industrial chemistry was that it was, having regard to the age of the world, a comparatively modern growth, a sudden development; it had come with a rush. He recalled that he had read, though he had not verified, the record that in the middle of the eighteenth century that accomplished and inquisitive and quarrelsome man, Joseph Priestley, when he produced his book on chemistry, asserted in the preface that it contained all that was to be known on the subject. He discovered oxygen, though indeed he was not the only person to discover it. It was one of the charms of chemical science that quite a large number of people discovered the same thing at the same time.

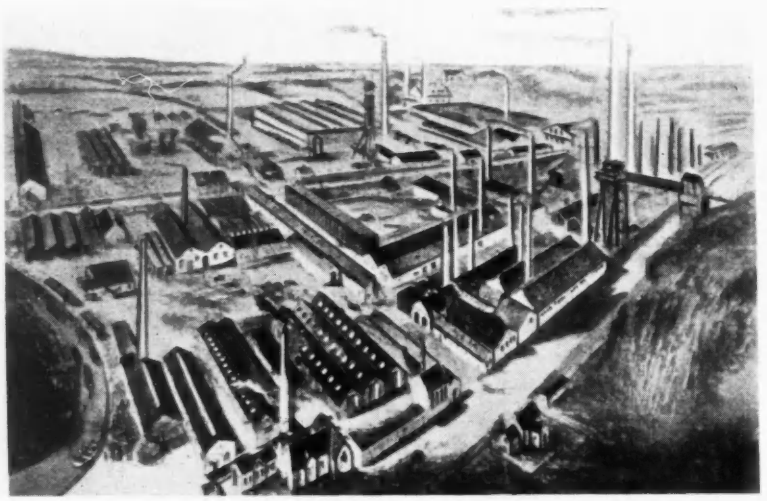
He recalled how that famous contemporary of Joseph Priestley, Lavoisier, who himself was one of the discoverers of oxygen, was engaged at the time of the French revolution in some important chemical experiments which, if he mistook not, were for the purpose of applying chemistry to the advancement of agriculture, when he received the unfortunate news that he was about to be guillotined. He made a reasonable proposition that the execution should be put off for a fortnight in order that he might complete his experiments, but the revolutionary tribunal gave the answer that the commonwealth had no need of chemists. There was no need to remind them of how rapid the advancement of industrial chemistry had been since that time. If such a lamentable event were to recur in any part of the world not even the most advanced and reckless or violent of modern states would ever deem it safe to say it had no need of chemists.

Common Use of Scientific Facts

As he had come to that remarkable gathering not to instruct but to learn, he ventured to ask how far the amazing new discoveries of their science were the result of the ordinary course of reasoning, or on the other hand how far were they due to what might be described as a lucky shot; or, to put a more apposite question, how far were they due to "Chance" and how far were they due to "Hunt." A famous scientist was once asked to define metaphysics and he replied that metaphysics was like a blind man in a dark room searching for a black hat that was not there. He would like to know whether in the pursuit of chemical research people were really searching to see if there was anything there, or whether, on the other hand, they were pursuing a course of strict deduction and reasoning. It was a striking fact in human history that mankind and industry had made use of the facts of science before they appreciated what those facts were. The village blacksmith directed a strong current of air on to the flame in order to increase its potency without necessarily knowing anything at all about oxygen. Every farmer's wife in this country, when one had the misfortune to be stung by an insect, at once inquired whether it was a bee or a wasp. If it was a bee she ran for the blue bag, and if it was a wasp she fetched the vinegar, and yet it might well be doubted whether she could give an account of the differences between acids and alkalies.

Some of them when in Scotland had probably seen the ghillie or shepherd at the end of a heavy shower turn his cloth so

that the wet side was inwards because he knew that was the best way to avoid getting cold, yet he would be quite unable to explain the transfer of heat by evaporation. It might safely be assumed that mankind had made use of chemical laws and reactions long before they understood what they were. He was reminded by the nature of that gathering that in all great advances three kinds of men were needed. First they needed the pure scientist, the man who discovered and expounded the laws of nature. Secondly, they needed men of inventiveness and genius, and, thirdly, they must have a great army of technicians who by concentrated labour over a vast field would bring the contributions of the other two groups to practical use. Unless he was mistaken, it was a lack of the third element that accounted for the fact that after the discovery of aniline dyes in this country the great dye industry was allowed to pass from England to Germany. To him and to a great many people who were not chemists it was amazing that in spite of all that had been said and done there was one thing that was no better understood to-day than before. No chemist was making it in his laboratory and none could order it even from the great institution in whose company they had assembled that evening. He referred to life itself Everything else was being analysed and discovered and re-created by synthesis, reproduced, as it were, by artificial means, but life was just where it had been before. It was a terrifying thought that all that immense concentration of thought and energy was also capable of serving the purposes of destruction. It would be a matter of supreme importance to the future of the world to see how far the development of industrial chemistry was taken, not by the chemist but above all by the statesmen of the world, for defensive and not for destructive ends. Sir Harry McGowan had played a very great part in that splendidly organised enterprise and had done much to raise the name and reputation of Britain in the world by helping to restore to this country one of the great industries which he trusted would continue for many generations to prevail here for the blessing of mankind.



The Oldbury Works in 1862.

Sir HARRY MCGOWAN, in responding to the toast, said that although they had assembled to celebrate a one hundredth birthday, the firm concerned was a live, lusty and vigorous youth. The name of Chance and Hunt was historical in the British chemical industry and he saw no reason why the firm should not continue for many years. Imperial Chemical Industries, consisting of a parent company with 120 subsidiary and sub-subsidiary companies, was a great example of co-operation achieved through financial identity. This was the most effective form of co-operation, but was only brought about by a measure of understanding through personal contact and co-operative work to which the war largely contributed. For national purposes men in the chemical industry had to work together and to help one another if their efforts were to have the most efficient results. Personal differences were sunk and men learnt to know and appreciate one another better than they had been able to do in the competition of more peaceful days.

There was, however, still greater need for industrial contact. Indeed, the evidence of Imperial Chemical Industries had taught them that the advantage of co-operation was such that they never ceased to press it forward actively in their relations with other concerns both at home and abroad. For this reason I.C.I. were members of many associations, notably of the Association of British Chemical Manufacturers, which as a representative organ dealt successfully with some of the difficult matters which must always surround the chemical industry. The Association also served other useful purposes in their relations with the Government. With the growing complexities of modern life, the rivalry between nations had necessarily increased the concerns of business with Government and of Government with business It might be said that business men were perhaps inconsistent, for they demanded at one and the same time that the Government should not interfere with business, and yet when business was in difficulties it was not unusual for business men to ask what the Government was going to do about it. These aspects were not necessarily irreconcilable. Co-operation with the Government was in these days essential. The British chemical industry stood fully for it, for it believed that a national government concerned with the interests of the nation, as a

The Oldbury Works as they are to-day.

nation, was equally concerned with all the great industries of the nation. Sir Harry gave the assurance that the British chemical industry would be always willing to place its ability, its information and its co-operation at the disposal of the Government.

Sir Harry thought that relations between industrialists themselves were still more fundamental. There had been for many years a persistent and growing tendency for industrial units to work on a larger and larger scale. As these concerns grew in size, their ramifications increased and their points of contact multiplied. They met one another not only in European but in other overseas markets. As these contacts increased, the occasions for friction grew with them—a friction which could only be avoided by co-operation between their leaders. I.C.I. were great believers in co-operation. They had practised it for many years, dating back now at least two decades, and had gained nothing but benefit. It was sometimes imagined that international arrangements were dangerous from the public point of view. This was not so. They were not made or maintained from any desire on the part of one company to do ill to others. I.C.I. followed this policy solely in order that they might contribute to national and international wellbeing. Never had international arrangements been used other than for friendly and peaceful purposes. Far from being a source of danger they were a source of strength and wellbeing to the world.

The Original Oldbury Plant

Mr. KENNETH H. WILSON, chairman of Albright and Wilson, Ltd., and Charter-Mayor of the newly created borough of Oldbury, proposed the toast of "Chance and Hunt." It was in 1835, he said that the first chemical plant of Chance Brothers was erected at Oldbury, representing a plant expenditure of £500. Six years later they bought the land which they had previously leased—an area of nine acres which cost them £2,050. Twenty years later his own great uncle, Mr. Arthur Albright, moved his works from Birmingham to Oldbury and purchased two acres of that land from Chance Brothers for £1,320, not a bad profit at that time. It was recorded that in those early days Mr. Albright rendered important assistance to Chance Brothers by purchasing from them a large supply of muriatic acid at 10s. per ton, and he believed a thousand tons were purchased later at 5s. per ton. Some time later further assistance was rendered to the firm by the purchase of vitriol, which was supplied by pipe-line over the party wall.

In spite of what might to-day be considered low prices for those commodities, the company continued to flourish. Amongst the outstanding names associated with the company in the intervening years there were two that were synonymous with Chance and Hunt, namely, those of Alexander Chance and Edwin Hunt. Alexander Chance became managing director in 1868, and he was well known to many of them in the chemical industry for his business ability and technical achievement. They at Oldbury remembered him chiefly for his many benefactions and his devoted public spirit. In many of his public activities he was associated with members of his (the speaker's) own company and the friendships started in their early days were further strengthened. His three sons were all associated with him in his works at Oldbury. Mr. Perry, as they all knew, was chairman of Chance and Hunt, Ltd., during the anxious years of the war, when he had great responsibilities with regard to the factory erected there by the Government. Mention must also be made of their dear friend, Mr. W. A. S. Calder, this year's president of the Society of Chemical Industry, whose association with Chance and Hunt, Ltd., dated back to 1899.

Importance of Personal Contact

Emphasis had been laid upon the desirability of close co-operation in the business world, both nationally and internationally. While to-day they might transact much of their business by telephone, or employ the aeroplane or the high speed train, there was still a strong desire for that personal contact which prevailed 80 to 100 years ago. His allusions to the association of Chance and Hunt, Ltd., with Albright and Wilson, Ltd., might be taken as an example of how two companies could be of assistance to one another and work together to the mutual benefit of both. Mr. Wilson went on to trace the history of the amalgamation of Chance Brothers with William Hunt and Co., the taking over of the company by Brunner, Mond and Co., and the ultimate amalgamation with Imperial Chemical Industries, Ltd., as a result of which it became part of the general chemical group. It had been said that rationalisation tended to destroy individuality, but the relations existing between them had demonstrated that the reverse was true.

Mr. W. A. S. Calder, a member of the delegate board of Imperial Chemical Industries, Ltd. (General Chemical Group), director of Chance and Hunt, Ltd., and this year's president of the Society of Chemical Industry, who responded to the toast of Chance and Hunt, Ltd.

Dr. WEBER ANDREAE, director of the I. G. Farbenindustrie, supported the toast and paid a warm tribute to the enterprise of the British chemical industry in general, and that of Chance and Hunt, Ltd., in particular. The industry had been built up under the leadership of men of great foresight, prudence, energy and courage, and in offering congratulations to the company upon the achievement of its centenary he felt they, of the twentieth century, could congratulate themselves upon having inherited all that the chemical industry of the nineteenth century had prepared for them.

Mr. W. A. S. CALDER, in responding to the toast, gave some amusing reminiscences of his early days with the company, and announced that a number of telegrams had been received expressing wishes for the continued prosperity of the company in its second century.

Mr. R. GROSVENOR PERRY proposed the toast of the chairman, to which Sir HARRY MCGOWAN briefly responded.

Institute of Chemistry

Examination Results

THE Institute of Chemistry has issued the following pass list relating to the September-October examinations:

Examination in general chemistry for the Associateship: D. C. M. Adamson, Woolwich Polytechnic; N. R. Campbell, Sir John Cass Technical Institute; W. C. Candler, Central Technical College, Birmingham; E. Carter, College of Technology, Manchester; P. M. Crosbie, University College, and Polytechnic, Regent Street, London; A. L. Davis, Birkbeck College, London; A. Grainger, City of Liverpool Technical College; R. S. Hartley, Technical College, Huddersfield; D. A. Lambie, Sir John Cass Technical Institute; J. G. Norvall, B.Sc. (Lond.), trained under R. S. G. Knight, Ph.D., F.I.C.; A. C. Paterson, Technical College, Paisley; J. L. Pinder, B.Sc. (Lond.), College of Technology, Manchester; C. F. Roberts, College of Technology, Manchester; D. Rodger, Heriot-Watt College, Edinburgh, and Royal Technical College, Glasgow; L. Rose, Central Technical College, Birmingham; R. J. L. Skelton, Polytechnic, Regent Street, London; H. S. Tasker, Oxford University; C. S. Wilson, B.Sc. (Aberd.), Aberdeen University.

Examinations for the Fellowship: In Branch A: Inorganic chemistry, with special reference to metallurgy: J. H. Burton, B.Sc. (Lond.). In Branch B: Physical chemistry, with special reference to technical applications: P. L. Bilham, B.Sc. (Lond.). In Branch C: Organic chemistry: M. Crawford, B.Sc. (Glas.), Ph.D. (Munich). With special reference to terpenes and synthetic perfumes: B. T. D. Sully, B.Sc. (Lond.), A.R.C.S. In Branch D: Biochemistry, with special reference to the chemistry and bacteriology of dairy products: J. H. Adamson, M.A. (Cantab.). In Branch E: The chemistry, including microscopy, of food and drugs, and of water: K. Bullock, Ph.D. (Manc.), F. W. M. Jaffe, B.Sc. (Lond.), G. H. Turner, B.Sc. (Liv.). In Branch G: Industrial chemistry, with special reference to fine chemicals: B. Edgington, B.Sc. (Lond.). With special reference to sewage purification: G. S. Clements, A.R.C.S.

A Symposium on Azoic Colours

Problems of the User and Manufacturer

MR. L. G. LAWRIE presided over a large attendance at a symposium on "Azoic Colours," held by the Manchester Section of the Society of Dyers and Colourists, on October 18.

Mr. E. B. ADAMS said that by the introduction of azoic colours the cotton dyer had been offered a most wonderful addition to his resources, as they filled a serious gap in heavy shades, particularly reds and blues which were fast to washing and bleaching. Nevertheless, he maintained that to correct an azoic shade was more difficult than to do so with a shade in any other class of dyestuff. Matching presented a certain amount of difficulty and the rubbing trouble was not yet completely solved. He had not yet met the dyer who, finding he had obtained the correct shade with two soapings, would risk giving it the third soaping which was recommended through fear of an off shade being produced. Trouble also occurred by blinding, while stripping also presented its problem. Some of the other classes of dyestuffs presented some of the difficulties he had mentioned, but quite definitely the azoic dyestuffs presented them all.

Artificial Silk

Mr. C. M. WHITTAKER thought that in connection with azoic colours for artificial silk there were far too many naphthols and far too many bases. In order to examine those naphthols and bases in the laboratory, quite a staff of chemists was required to carry out the necessary work. Of course, their number provided the makers with a splendid excuse when complaint was made; they always stated the wrong ones had been used. This position was counter-balanced largely by the fact that viscose had a very much greater absorption power for the naphthols than cotton which eased the situation. A remarkable fact about azoic colours on viscose was that he had never found rubbing to cause any trouble. In the case of naphthol on viscose the coupling should be very rapid in order that the dyeing should go well. Another thing which caused considerable trouble with naphthols was that although they could be soaped perfectly clear there was great susceptibility to pressure and there was marking off. He had a great deal of praise to offer for azoics in the case of acetate yarn.

Real Silk

Mr. C. M. KEYWORTH pointed out that although the general method of application of azoic colours on real silk was the same as that for cotton, the great differences between the animal and vegetable fibres caused many differences in technique. The injurious effect of caustic soda on real silk was well known, and impregnating baths must not exceed a certain concentration of caustic soda. Most naphthols had a poor affinity for silk, so that correspondingly large quantities of caustic soda and naphthol were necessary; moreover, it was essential to impregnate for a longer period than for cotton. The cost of the dyeing was kept down by using larger quantities of salt or Glauber's salt. It was interesting to note that alkaline solutions of naphthols could not be padded on to real silk as on cotton. Poor weak shades, loose to rubbing and badly penetrated, were thus produced. Padding with a naphthol solution containing caustic soda and then drying the silk was obviously out of the question, and a means of dissolving naphthols without caustic alkali would be welcomed by silk dyers. On the other hand, the affinity of the diazo compounds for silk was very high, and coupling baths could be completely exhausted.

Printing Problems

Mr. R. J. HANNAY dealt with the problem of printing. One of the earliest difficulties was that of obtaining a sufficiently stable diazo solution to retain its full value during any reasonable length of printing time; and the printer attempted to meet this, with considerable success, by using ice-cold colour boxes and rollers. The method was cumbersome and awkward in practice. Witt discovered that the addition of naphthalene trisulphonic acid to the diazo solution of para-nitraniline gave a comparatively stable solution. This substance was sold under the trade names of Azoguard and Paradinol. The printer often required small quantities of diazo solutions at short notice and owing to the decomposition of such solutions when stored, even when kept as "acid standards," *i.e.*, as the diazo hydrochlorides, difficulties arose when small quantties were required at short notice. This gave rise to the production of stabilised diazo products in powder form which could be quickly dissolved and colours prepared in just the correct quantities for printing. The development of these products took place, first, by the production of mixtures of the acid sulphates of bases with naphthalene sulphonic acids, aluminium sulphate and nitrite of soda which when dissolved in water rapidly diazotised; and finally the production of the form of fast colour "salts" sold at the present time, in which the diazotised base was coupled with certain naphthalene sulphonic acids or fluoro-sulphonic acids and salts such as alumina sulphate added These colour salts were remarkably stable and worked well, giving clean pure shades.

Bleaching

Mr. W. KERSHAW, dealing with azoic colours from the point of view of the bleacher, said it was recognised that there were in use at the present day, a very large number of combinations of the naphthols. From the literature and by experience it was clear that these combinations varied considerably as to the effect of kiering, the tendency to rubbing, marking off, and to the action of chemicals. In the majority of cases, the bleacher had no idea as to the combination used, and must rely on the efficiency of the yarn dyer. Assuming the yarns were properly dyed, the bleacher exercised his discretion regarding the bleaching operation he used. The peroxide bleach was a very flexible one, and great play could be made with temperatures, time, concentrations, stabilisers, and assistants. He was of the opinion that a further characteristic should be in the manufacturers' pamphlets, namely, the "peroxide number."

The Dyestuff Manufacturer

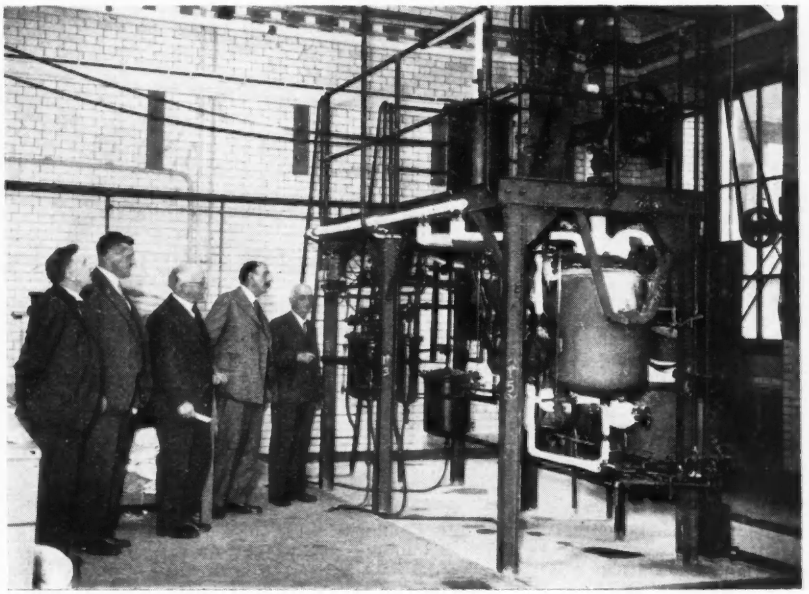
The view-point of the dyestuff manufacturer was dealt with by two speakers, namely, Mr. H. BLACKSHAW and Mr. A. F. WILLIAMS.

Mr. Blackshaw said that in cop dyeing the initial difficulties were considerable, but present-day technique enabled bulk production to possess a very satisfactory fastness to rubbing and washing. In connection with chain warp dyeing considerable progress had been made in certain shades on singles yarn and a good standard of dyeing was possible. The successful dyeing of heavy shades on two-fold yarns could not as yet be considered a practical proposition without extra cost due to special clearing operations which usually caused undue weakening of the shade. A very high standard of work could be obtained with linen yarn, and he had seen bulk dyeings which were outstandingly excellent in fastness to rubbing and washing. To obtain this result special mechanical methods of after-treatment had been employed.

Mr. Williams said that the article to be worn needed, in his opinion, to have the best possible fastness to washing and a fair good fastness to light; whereas a material for, say, curtains required the reverse, namely, the best possible fastness to light with fair to good fastness to washing.

Canadian Metal Mines Dividends

ACCORDING to the "Northern Miner" (Toronto) dividend payments by Canadian metal mines during the current year may be in excess of $52,000,000, a new high record for the industry. So far, to the end of September, actual payments and dividends announced total $40,405,844, bringing the aggregate payments to date for Canada's metal mines to $633,993,698 since the beginning of mining operations. Of the 1935 figure $24,468,920 has been provided by the gold mines; $15,613,040 by the base metal operators; and the remainder, $323,884, largely by holding companies.



A group photographed at the Royal Technical College, Glasgow, when Sir John T. Cargill, Bt., on behalf of a group of leading oil companies, presented the College with new plant for the technical chemistry department. Left to right —Professor William M. Cumming, Sir Arthur Huddleston (director), Dr. Robert Robertson (chairman of Governors), Sir John T. Cargill, and Mr. Thomas Donaldson.

Gift to Glasgow Technical College

Oil Companies Present New High Pressure and Distillation Plant

ADDITIONS to the chemistry equipment of the Royal Technical College, Glasgow, comprising two plants presented by the Anglo-Iranian Oil Co., Ltd., the Burmah Oil Co., and Scottish Oils, Ltd., were formerly inaugurated on October 15. They consist of a high-pressure plant for the investigation of reactions under pressure and temperature, and a still and fractionating column for teaching the principles of distillation and for research. The plants were handed over to the college immediately after the annual meeting of the governors by Sir John T. Cargill, on behalf of the three oil companies.

Dr. WILLIAM M. CUMMING, "Young" Professor of Technical Chemistry, in describing the gifts, said they comprised units which would find no equal in any educational institution in the country, and their installation represented a notable development in the work of applied chemistry in the college.

Sir JOHN CARGILL, in making the presentation, said the connection between the companies and the college had been a close and old one. It was not surprising that their response was immediate and whole-hearted when he put before them the suggestion of Sir Arthur Huddleston (principal of the college) that they might give some assistance to the college by providing it with equipment of this description. The directors had no hesitation in saying that they would be only too pleased to bear the entire cost. It was hoped that their action would in due course be reflected in the college providing chemists who were highly trained and equipped for playing their part in the development of the companies.

In every industry to-day research work was recognised as the keynote of progress, and for that reason the oil companies employed large numbers of chemists and other skilled men who were entirely engaged in research work in various directions. The companies in the past had drawn to a considerable extent upon the students of the college. The still and fractionating column had enormously cheapened the cost of production of the more valuable oil products. Without them he did not know how the motor and other industries, in which petrol and light oils, and now heavy oils, were necessary, would have progressed.

Mr. THOMAS DONALDSON, convener of the Committee on Chemistry and Metallurgy, accepted the plants on behalf of the college, and Dr. Robert Robertson, chairman of the governors, also conveyed to Sir John Cargill their appreciation of the gift.

Up till now the chemistry department has possessed no facilities for demonstrating the principles of distillation, and the new installation will meet this need and at the same time afford opportunities for research into the problems connected with this important industrial operation.

The plant, constructed by the Kestner Evaporator and Engineering Co., Ltd., has been designed in the first instance to give the maximum of flexibility, and can be worked under atmospheric or reduced pressure. In order that it may give results comparable with those obtainable on the large scale, the capacity of the still has been fixed at 25 gal. It can be operated as a batch or continuous still, a reboiler of 2 gal. capacity being available in the latter case. These vessels are heated with open or closed steam or with an electrically-controlled heating unit which allows of the temperature range being increased to 415° C. Such a range of temperature will allow of the still being used for the separation of the components of, say, petroleum or coal tar from the lightest to the heaviest fractions.

The column has one or two interesting features. Constructed of cast iron, each of the plates has seven bubbler caps. Each plate is also provided with a sight glass for easy access to the downtakes, and with liquor sampling cock and thermocouple pocket to allow of temperature measurement. The automatic control of the reflux deserves mention. The liquor from the condenser passes either to a water separator or to the reflux control box, which has a rocking chute operated by electro-magnets such that the reflux can be deflected to the column and to the receiver in any fixed ratio. This allows of accurate measurement of the reflux ratio with the relatively small quantities involved. The electro-magnets are controlled by a motor-driven commutator through mercury relays. The product passes through a cooler to the receivers, of which three are provided, of 10, 5 and 2 gal. capacity. All exit water from the plant can be measured, so that a material and heat balance for the whole plant can be calculated.

The high pressure plant is intended for the investigation of reactions under pressure and temperature to 200 atmospheres and 500° C. It in intended for research, but will form a useful addition to the teaching equipment of the

department. The autoclave, of working capacity of 1¼ litres, is constructed of Ni.Cr.Mo. steel and is provided with mechanical stirrer. The gland is water cooled and the shaft is lubricated under balanced pressure. At the bottom of the autoclave there is an exit pipe which allows of complete drainage of the contents and of sampling the reaction mixtures. The autoclave is heated electrically, the temperature being taken at several points by means of thermocouples.

The circulatory system consists of preheater and catalyst chambers supplied by Hadfields, Ltd. Both vessels are heated internally. From the high pressure receiver the gas is circulated at a rate of 50 litres per hour by means of a pump. Ample provision is made for reading the pressure at various points in the system. A connection is provided between the circulatory system and the autoclave so that these can be placed in connection for certain experimental work.

The Ethanolamines in Industry

Use as Absorbents for Acid Gases and as Emulsifying Agents

THE use of synthetic compounds of rigid specification in manufacturing industry instead of natural products of uncertain composition and variable effect conveys exactitude and certainty of operation and control that is one of the foundations of the great development of applied science in the present century. This is brought out very clearly in a booklet on "Synthetic Organic Chemicals" which has been published by General Metallurgical and Chemical, Ltd., in its capacity as agents for products manufactured by the Carbide and Carbon Chemicals Corporation of America.

The ethanolamines, to which special attention is directed in this booklet, may be said to combine in different degrees the properties of glycerol and ammonia in a single chemical compound. They are soap- and salt-forming bases, and the applications of both of the free bases and their derivatives are exceedingly widespread. Alkalinity and volatility decrease with successive substitution, as the following comparative table indicates:—

	Monoethanolamine $NH_2CH_2CH_2OH$	*Diethanolamine* $NH(CH_2CH_2OH)_2$	*Triethanolamine* $N(CH_2CH_2OH)_3$
Equivalent	61	105	146
*p*H (5% aq.) =	11.7	11.3	10.5
b.p.	172° C.	268° C.	208° C. (10 mm. Hg)

All three ethanolamines are available separately in a state of practical purity on a wider scale of availability and attractive price levels, while the popular commercial triethanolamine, consisting of a specified mixture of all three, with the tri-compound largely predominating, is the cheapest of all and unexcelled for many industrial purposes. The ethanolamines are valuable as emulsifying agents, organic neutralising and condensing agents, alkaline catalysts, and absorbents for acid gases. The gradation of properties in the series is such that for each purpose a particular ethanolamine is best suited, though all three are to a large extent applicable; and with this in view some valuable functions of monoethanolamine and triethanolamine are described in detail.

Some Suggested Uses

Monoethanolamine is the most strongly basic of the ethanolamines and is well suited as an alkaline condensing agent and catalyst for organic reactions. It is freely soluble in many organic media, has only a faint ammoniacal smell, and is somewhat more strongly alkaline than ammonia. It is thus a more convenient and less volatile agent than alcoholic ammonia or potash, and the following are instances of its suggested use:—

Condensations (*e.g.*, the Claisen condensation between aromatic aldehydes, ketones and esters, resinification induced by strong alkalies being thereby avoided).

As an *alkaline catalyst* in synthetic resin polymerisations.

In *gas purification.* Monoethanolamine has many exceedingly interesting properties, in some respects superior to those of triethanolamine which has itself proved very useful in this field. Monoethanolamine and some of its inorganic salts are among the most hygroscopic materials in existence; they are, in marked distinction from many purely inorganic absorbents, freely soluble in water in all proportions, vapour pressures are low and stability good, and they provide a readily performed cycle of absorption and regeneration without deterioration of monoethanolamine. As an example, in the removal of carbon dioxide from flue gases, water gas, hydrogenation of fats, or gases for the exacting requirements of ammonia or methanol synthesis, monoethanolamine carbonate is first formed:—

$$2NH_2CH_2CH_2OH + H_2O + CO_2 \xrightarrow{20^\circ\ C.} (NH_2CH_2CH_2OH)_2H_2CO_3.$$

The cycle of absorption and regeneration consists in the further absorption of carbonic acid to the bicarbonate, which at higher temperatures readily reverts to the normal carbonate:—

$$(NH_2CH_2CH_2OH)_2H_2CO_3 + H_2O + CO_2 \underset{60^\circ\text{-}100^\circ\ C.}{\overset{20^\circ\ C.}{\rightleftharpoons}} 2NH_2CH_2CH_2OH.H_2CO_3.$$

This reversible equation shows that in the form of the neutral carbonate, 2.77 lb. monoethanolamine can absorb and release 1 lb. of carbon dioxide, or one volume of monoethanolamine can absorb and release about 220 volumes of carbon dioxide at 20° C. and atmospheric pressure. The low viscosity of monoethanolamine will easily permit the use of 75 per cent. solutions in water as starting material, and the small bulk of liquid thus required results in economy in handling, heating and circulating.

In a similar manner, hydrogen sulphide may be absorbed, monoethanolamine carbonate being a more effective and more stable carrier than the sulphide:—

$$(NH_2CH_2CH_2OH)_2H_2CO_3 + H_2S \underset{60^\circ\text{-}100\ ^\circ C.}{\overset{20^\circ\ C.}{\rightleftharpoons}} NH_2CH_2CH_2OH.H_2CO_3 + NH_2(CH_2)_2OH.H_2S.$$

A Reactive Participant in Syntheses

In distinction from *assisting* chemical reaction, monoethanolamine is a *reactive participant* in some useful syntheses, especially with regard to products having medicinal or therapeutic value. Novocaine, a well-known local anæsthetic, may be prepared by the condensation of *p*-nitrobenzoyl chloride and monoethanolamine, followed by ethylation of the amino-compound with diethyl sulphate and alkali and reduction of the nitro group.

$$C_6H_4(NO_2)COCl + HO.CH_2CH_2NH_2 \longrightarrow C_6H_4(NO_2)CO.O.CH_2CH_2NH_2 \longrightarrow C_6H_4(NO_2)CO.O.CH_2CH_2N(C_2H_5)_2$$

(reduced).

Monoethanolamine is also closely related to the adrenaline and choline group of therapeutical products.

Complex and insoluble acidic substances are readily converted into very soluble derivatives by means of simple combination with monoethanolamine. As examples of this are the solubilising and preservative action effected by monoethanolamine on the natural products, casein, rubber latex, and shellac, all of which are readily dispersed by the ethanolamines. Such dispersions are stable and have very useful applications in the manufacture of adhesives, finishes, textile sizes and other products.

In comparison with monoethanolamine, triethanolamine is a much weaker base and is viscous and practically non-volatile. Its soaps are thus practically neutral and are not readily decomposed by heat; they are more soluble in hydrocarbons, oils and fats than the corresponding monoethanolamine soaps. This combined with surface tension depressant qualities of the highest order render these soaps of great value in textile detergents and dry-cleaning, being free from deleterious effects on the most sensitive fibres), and in the efficient emulsification of oils, fats, waxes and associated products. In distinction from its use in the preparation of technical emulsions, the free base has applications as a mutual

solvent, penetrant, moistening agent, neutralising base soluble in oils, fats and other organic media, and for the derivation of soaps and salts of pharmaceutical value.

Triethanolamine ricinoleate is effective in bacterial detoxification, and the camphorate, borate and theophyllin derivatives are also therapeutically useful and freely soluble in water and organic solvents. A characteristic feature of the ethanolamines is their ability very simply to convert insoluble complex acids into very soluble derivatives.

In order to prepare a neutral soap or salt, triethanolamine may be *estimated* for total alkalinity by diluting an accurately weighed sample of about 5 gm. to 200 c.c. and titrating with normal hydrochloric acid in presence of methyl orange. The equivalent weight, which is specified between 137-142, is then equal to the weight of the sample divided by the product of the volume of acid in litres times its normality. Triethanolamine soaps are formed simply and directly by admixture with the acid in combining proportions, the acid adding to the nitrogen atom without detachment of the elements of water.

For the manufacture of textile detergents, wetting agents and dry-cleaning soaps the soaps of triethanolamine with oleic acid, sulphonated oils, etc., are neutral, powerful penetrants, and freely soluble in water, alcohol, mineral spirits and some chlorinated hydrocarbons. The incorporation of small proportions of triethanolamine into liquids considerably promotes their penetration into porous materials, and as a substance both non-volatile and excessively hygroscopic it imparts a very permanent moistening effect; these qualities convey innumerable applications and possibilities in the technology of textiles, wood, leather, ceramics, floor coverings, etc.

As already indicated, triethanolamine soaps, such as the oleate, stearate, caseinate, ricinoleate, etc., are formed by simple admixture with fatty acids and are emulsifying agents of the first order. The many excellent features of triethanolamine emulsions may thus be summarised as follows :—

Stable Dispersion.—The uniformly small size of all particles is invaluable where an even spreading or penetrating product is desirable.

Neutrality.—The *p*H value of triethanolamine soaps is around 8; thus emulsions are free from harmful effect on tissues or corrosives effect on metals.

Ease and Convenience.—Triethanolamine emulsions are made with simplicity and despatch and without the necessity of long practice.

Efficiency at Low Concentrations.—The very small proportions necessary for proper emulsification further contribute to the ideal quality of triethanolamine as an emulsifying agent by further ensuring the harmless character of its emulsions on sensitive material and promoting economy.

Triethanolamine soaps are much more freely soluble in mineral oils than soaps from inorganic alkalies and are readily prepared with a very low concentration of soap and a very high content of oil. These easily disperse in water to yield excellent emulsions of fine, regular and stable dispersion. These oils usually require from 3.5 to 4 per cent. triethanolamine and 8 to 11 per cent. of oleic acid.

Letters to the Editor

Modern Methods of Welding

SIR,—The paper presented to the Institution of Chemical Engineers by Mr. Davy gives an optimistic picture of the extent to which welders can now meet the requirements of their clients. The moral, as seen by the onlooker, would seem to be " weld always " ; but I submit that there is another side to the picture. The art of welding is as yet far from finality, and even X-rays cannot detect all the flaws there may be in a welded joint. Where a joint has to withstand a pressure of any real consequence the joint is always X-rayed I believe that Lloyds insist for certain vessels that X-ray pictures shall be taken of every joint throughout its whole length. Undoubtedly marvellous work is being done, but both Dr. Dorey, of Lloyds, and the author agreed that it is necessary to design weld grooves in such a way as to ensure that any cracks produced shall be in a certain plane or within certain definite planes. It may, of course, be possible to do this, but with so complexly strained material as an important weld there is no guarantee that the desired result will be achieved. With all our scientific methods, therefore, we still have a margin of uncertainty about soundness of the weld.

Structural steel work is not usually welded, and possibly this may be due to the collapse of a London station roof some few years ago. To this day, firms who erect structures supported by framework usually bolt their framework to avoid any danger through imperfect welding. The difficulty, in this case, is probably not in the imperfections of the welding process but in the human factor.

The author gave some account of the theory of the atomic hydrogen welding process. It is, of course, well known that owing to dissociation at higher temperatures gases undergoing combustion cannot complete their combustion until the temperature has fallen somewhat. There is nothing inconsistent in the conception of dissociation of molecules in the electric arc. It is open to question, however, whether any considerable fraction of the atomic hydrogen remains uncombined until it is brought into contact with the metal, and it seems just as likely that the heat is primarily provided by the electric current, the gases performing some secondary chemical—or possibly physical—work. It would be extremely useful, Sir, if you could prevail upon the author of this paper to give us the evidence in full which Dr. Harris mentioned was available. Furthermore, why should hydrogen be used for the purpose? All bi-molecular gases will dissociate under very high-temperature conditions. Is it not possible that some gas might be found that would do the work equally well so far as concerns its dissociation effect and better in its lack of chemical effect upon the metal? If no other gas will have the same thermal effect, then, unless it can be proved that the heat of re-association of hydrogen is very much greater than that of other elements, I submit that the author's explanation of the action of hydrogen is not convincing.

There is one point not mentioned in the paper to which reference might be made. As long ago as 1903 Fouche and Picard recognised that too high a temperature of the welding gases was unsatisfactory. That part of any oxy-acetylene flame that is used for welding has a temperature around 3,300 to 3,500° C. Iron melts at 1,500° C. and boils at 2,450° C. The weld should be made between these temperatures. The electric arc and the acetylene gas flame, to mention two welding agents, are both unnecessarily, and it seems unwisely, high. A recent development is the use of a mixture of gases, such as acetylene and coal gas, which will give a flame within the necessary temperature limits without too great dependence upon the operator. I am informed that this process gives a remarkably pure weld without imparing its strength because the lower temperature of the welding flame reduces the amount of oxide absorbed by the welded metal and also avoids the difficulties in regard to carbon when certain metals, *e.g.*, cast iron, are subjected to great heat. There is possibly also a certain advantage in localising the area of great heat since the expansion and contraction are minimised and the difficulties described at the meeting in question regarding the support of a vessel during welding may be reduced.

Finally, as a works manager, I should have grave misgivings about subjecting any vessel to very high pressures that had not been normalised after welding, and I was pleased to hear that Babcock and Wilcox regard this as imperative. The present trend of the chemical industry towards high pressures has placed upon plant manufacturers an added burden, and that burden they are meeting well. May I quote the words of the chief engineer at Billingham : " The steel makers have entered into their requirements wholeheartedly. Steels that were new have been demanded involving great difficulties in manufacture, but they have come up to the scratch in the most amazing way." If this spirit continues to dominate the British chemical plant industry, the country need have no fear of retaining and extending its position in the world of chemical manufacture.—Yours faithfully,

WORKS MANAGER.

Developments in Grass Drying

Imperial Chemical Industries Design a New Drier

ACCORDING to a booklet entitled "Grass Drying," which has just been issued by Imperial Chemical Industries, Ltd., the importance of the high feeding value of young grass was first realised by the late Professor T. B. Wood, of Cambridge, who in 1927 also showed that the feeding value could be preserved by drying. Some five tons of dried grass was made at Billingham, and during the following winter Professor Wood demonstrated that this dried grass could replace ordinary concentrates rich in protein, for fattening cattle. As a result of this demonstration it was apparent that if a suitable farm drier could be made, farmers would be able to produce more grass and harvest it, irrespective of weather, when it had reached the stage of highest feeding value.

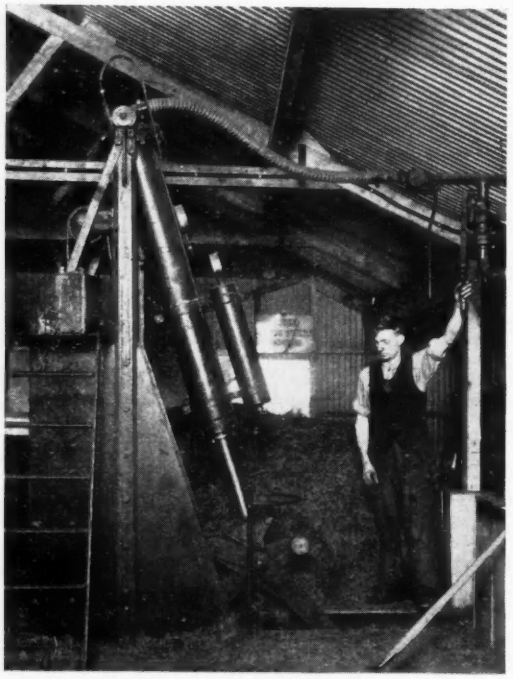
Dried grass contains about 9 per cent. of minerals. This is two or three times as high as the minerals in grains and

The Large Drier. Forking fresh grass on to the tray.

concentrated feeding-stuffs. There is also present, unimpaired, the vitamin potency of fresh grass. So far as is known, the most important vitamin value of fresh grass depends upon its content of the yellow colouring matter, *i.e.*, carotene. The carotene is partly converted into vitamin A by the animal. This vitamin A is stored up in the liver. In the case of the milking cow part of the carotene is passed on as such in the milk—the rich colour of summer milk and butter depends on this—and part is passed on as vitamin A. The vitamin A in milk is essential for the growth and health of those fed upon it, human beings no less than animals.

Baled dried grass does not appear to be over-valued at £7 to £9 a ton, according to quality, on the farm, and these prices are being obtained for the small supplies which are available.

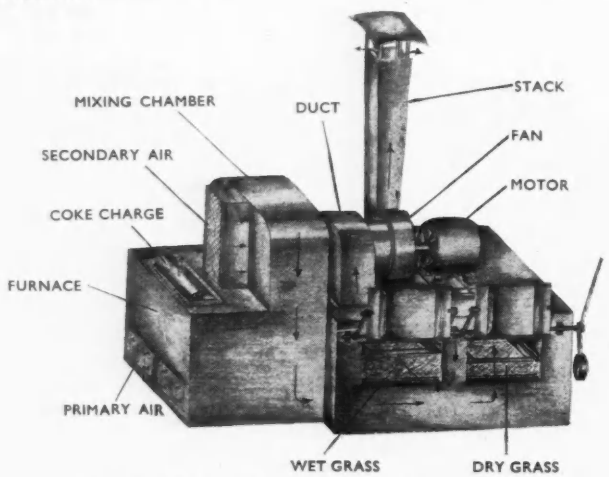
The Billingham drier for which patents have been applied for has been designed to meet the requirements of the farm. It is arranged so that the grass may be dried in two successive stages, by a current of hot air drawn upwards through 24 in. beds of grass by means of a fan. The grass is laid on trays which are placed side by side in drying chambers connected by air passages. The grass is held in position by weighted steel hurdles. During a 25 minutes' cycle one tray



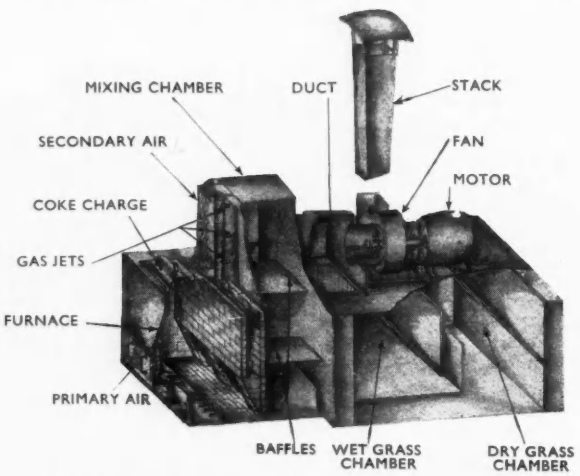
Baling Dried Grass. The dried grass is placed in the trough seen below the operator and compressed by the hydraulic ram.

of grass is partly dried, and the other tray of grass, which has previously been part dried, is completely dried. At the same time another pair of trays is made ready outside the drying chamber, so that, except for short intervals when the trays are exchanged, drying is continuous.

When drying is complete, as shown by a thermometer, the



Sketch of drier with door open; the arrows show the direction of flow of the drying air.



Drier partly cut away to show internal structure.

trays are removed. The dried grass is transferred to the baler and a fresh charge of grass is prepared. This is done by forking the partly dried grass from one tray to the other, and filling the empty tray with wet grass. The process just described gives an absolutely uniform product and the fuel consumption is very low. Coke or anthracite is burned, to provide hot air for drying, in a steel chamber lined with firebrick. A lid is provided at the top of the furnace for coke charging, and air is drawn in at the front through firebars, which enable the fire to be kept clear of ash. The hot gas from the furnace is burnt at jets and is controlled by means of a valve. This system is an efficient method of obtaining hot air for drying.

A fan mounted on top of the drying chamber draws air through the drier. The air is heated to 150° C. by mixing with the hot gases from the furnace described above, and passes upwards through the tray of partly dried grass. It then passes down between the trays and upwards again through the wet grass bed. Leaving the wet grass it passes through the fan to atmosphere via the chimney. The four doors of the drier are coupled in pairs so that one lever operates two doors simultaneously. Balance weights make the operation easy. The rubber facings on the doors completely seal the drying chambers when the doors are closed. Heat losses are avoided by lagging. Dried grass is very light, being less than 2 lb. per cu. ft. in bulk density. To facilitate storing and handling, the dried grass is compressed into bales of density 20 lb. per cu. ft. Each bale measures 30 in. by 24 in. by 18 in., and weighs 90 to 100 lb.

The cost is fairly constant for a given size of drier, and knowing this cost, it is easy to calculate what will be the cost of drying any grass containing a known proportion of water. Assuming the following charges: Coke 27s. a ton, electricity ¾d. a unit, man labour 8d. an hour, the operating costs of the driers, including baling, are: Large drier, 11s. 5d. per ton of water evaporated; medium drier 12s. 7d. per ton of water evaporated. If, therefore, the ratio of water to dry matter in the fresh grass is 3½ to 1, the operating cost, including baling, per ton of dried grass will be 3½ times the cost per ton of water evaporated, that is: Large drier £2 per ton dried grass; medium drier £2 4s. per ton dried grass.

Leather Trades Chemists Meet at Islington

Visit of the President of the Belgian Section

A MEETING of the British Section of the International Society of Leather Trades Chemists was held on October 10, at the Royal Agricultural Hall, the president of the Section, Mr. M. C. Lamb, in the chair. In opening the meeting, the president extended a very cordial welcome to Monsieur G. Colchen, the president of the Belgian Section, and president-elect of the Society.

Giving his statement on the Tanning Analysis Commission, and its report as presented at the Brussels Conference, Dr. PARKER said it had been passed at the Conference that the Candle method only was to be the official method of filtration as from January 1, 1936.

The chairman then introduced the subject of the proposed draft specification for sole leather proposed by the British Standards Institution. This specification gave methods of analysis. It contained the following limits: Moisture (in the unconditioned state and as received) not more than 15 per cent., hide substance (in the conditioned state) not below 32 per cent., water solubles less than 25 per cent., ash not more than 2 per cent., degree of tannage not less than 60 and not more than 85, density up to 1.25. In commenting upon these figures, Dr. Marriott said that he failed to see the value of the moisture as received figure, while he was of the opinion that the degree of tannage should have the range of 55-90.

Works Chemist in the Shoe Factory

Mr. J. HILL, in his paper on "The Works Chemist in the Shoe Factory," said the chemist in the shoe factory was a recent introduction, due to the usually small unit size of the English works. Abroad, however, where factories were of a larger size, the chemist figured very largely. The work of a chemist in the factory could be put under four headings: (1) routine examination of all raw materials, (2) the preparation of the various finishes, (3) prevention and eradication of faults in shoes, (4) research work. In routine testing, a large number of materials were included, such as leathers, rubber, celluloid, fabrics, compo-boards, woods and metals. Sole leather was an important item, and in the author's scheme a practical test was made as well as a chemical examination. There had been, he said, a tendency over the past seven years for the water soluble matter in sole leather to increase, and it had been found that the higher the water solubles the more difficult was the control of the finishing.

With upper leathers, the nature of the finish was very important. This had to adhere perfectly to the leather, especially after wear, as everything depended upon the appearance of the shoe. Gold and silver kid were very liable to suffer from the effects of moisture, the metal leaf coming away from the leather surface. There was a very great need for a leather for making silver kid, which was immune from the action of moisture.

Dr. C. H. SPIERS, dealing with the hydration of leather, said it was found that when leathers absorb water, the increase in real volume is much less than would correspond with the weight of water absorbed, so that water appears to be compressed, *i.e.*, the volume of hydrated leather is less than the sum of the leather and water separately. In the initial stages, the water absorbed may have only about one-seventh of its volume in the free state, and in the later stages about one-half of its volume. The real densities of the leathers gradually increased with increase of water content, eventually becoming practically constant.

The determination of the acid neutralising power of vegetable tanned leather was the subject of a paper by Mr. W. R. ATKIN and Mr. F. C. THOMPSON. In view of the attempts now frequently made to protect leathers against the effects of acid atmospheres, the authors said it has become necessary to find a method for measuring the acid resisting capacity of leathers, and they proposed the following procedure: 1 gm. portions of leather are treated with 90 ccs. of 0.1N. KCl solution, x cc. of 0.1N. H_2SO_4 and (10-x) cc. of water, and allowed to stand 24 hours with occasional shaking. The pH of each extract is then determined by the glass electrode and the pH values plotted against 0.1N H_2SO_4. From a graph, the amount of acid is found which gives an extract of pH 3.0. Each cc. of 0.1N. acid so found corresponds to an acid neutralising power equivalent to 0.49 per cent. sulphuric acid in the leather. This method had the merit of being direct in that it shows how much acid a leather may contain before reaching a dangerous condition. All buffering power, whether of free amino groups or soluble or insoluble buffer salts, is taken into account, except that buffering below pH 3.0 is excluded. Previous work by the authors and by Wallace and Bowker has shown that below this pH deterioration is very rapid.

Use of Chlorinated Rubber

Chlorinated rubber as a leather finishing material was discovered by Mr. M. C. LAMB and Mr. W. E. CHAPMAN, who gave the results of an investigation originally undertaken on behalf of the Federation of Curriers, Light Leather Tanners and Dressers and embodied in a private report issued in 1933. The film produced when chlorinated rubber was dissolved in xylene and allowed to evaporate was the most suitable, being free from blushing, crinkling or orange peeling. The plastic property of the film was satisfactorily effected by the addition of dibutyl phthalate and tricresyl phosphate. Castor oil was not very satisfactory. The inclusion of synthetic resin assisted in getting better anchorage. Excellent results were obtained on application to moroccos to be subsequently wet grained. The application of suitably compounded mixtures of chlorinated rubber using xylene as the solvent resulted in the production of a finish possessing excellent gloss, fastness to wet rubbing and quite impermeable to water.

Economics of the Synthetic Manufacture of Ammonia—IV

Hydrogen and Compressor Plant

These notes were originally compiled in 1918, with the object of providing information necessary to decide whether it would be advantageous to manufacture ammonia synthetically as a commercial proposition in England. They are now published in the hope that they will prove useful to young chemical engineers, in showing the details involved in the preparation of such a scheme.

As the water gas would be made from the most suitable type of coke, the methane and sulphur percentage would be small. The ratio of hydrogen to CO would also be in favour of the hydrogen and probably up to 52 per cent. would be obtained, thereby increasing the yield of hydrogen per unit of coal. In the following notes, however, a poorer quality of water gas will be assumed, so as to be on the safe side. Taking

Hydrogen	48%
CO	42%
CO_2	5%
Nitrogen, etc.	5%

The yield of water gas to hydrogen in the catalysed water gas will be taken as 1.15 : 1, because 100 vols. of water gas become 139 vols. of catalysed water gas. The composition of the gas after catalysis would be :—

Hydrogen	62.5%	...	3,220,000 cu. ft. per 24 hrs.
CO	2.4%	...	113,000 ,, ,, ,, ,, ,,
CO_2	31.5%	...	1,620,000 ,, ,, ,, ,, ,,
Nitrogen	3.6%	...	185,000 ,, ,, ,, ,, ,,
			5,140,000 cu. ft. per 24 hrs. at 20° C.

The temperature of the catalyst is assumed to be 550° and the volume of steam 3 vols. to 1 of water gas. The efficiency of the catalyst is taken as 90 per cent. of the theoretical.

Removal of Water Gas Impurities

The water gas would be taken from the gasholder and boosted (three Weller type boosters each of 75,000 cu. ft. per hour capacity would be sufficient, allowing for stand-by) through oxide boxes. The area required would be about 3,600 sq. ft., so that a set of four boxes 30 ft. × 30 ft. × 4 ft. would be sufficient. Two extra boxes should, however, be installed, making six in all.

The quantity of sulphur obtained per 24 hours would be 300,000 × .002 = 7,400 cu. ft. H_2S = 0.29 ton of sulphur per 24 hours. This yield is insufficient to pay entirely for the installation of the oxide boxes, but it is necessary to remove the impurities in the water gas as far as possible so as to lengthen the life of the catalyst. The oxide box installation appears to be the most suitable way of effecting this purification.

The water gas would next pass along a main about 18 inches in diameter and be distributed to the catalysers. The water gas passing to each converter would be controlled by a flow rate indicator. The gas can either pass at will through a preheater unit and then through an interchanger, or the preheater unit can be cut out of circuit. After passing through the first interchanger, steam is introduced at a rate controlled by a steam meter and by the percentage of CO_2 in the catalyst gas, which would be automatically recorded, the total pressure being reduced to about 2 lb. The two together—steam and water gas—are then taken through the main interchanger into the converter. The latter would be a lagged cylindrical vessel about 10 ft. high × 6 ft. 6 in. in diameter, containing four trays about 12 in. apart, each tray being filled to a depth of about 10 in. with iron oxide catalyst of ⅜-in. grain.

Steam Requirements

The gas after passing through the catalyst passes back through the interchangers, leaving at about 125°, and passes to scrubbers for the removal of the steam, and thence to a small balancing gasholder of about 100,000 cu. ft. capacity.

The quantity of steam required would be

$$\frac{3 \times 3{,}700{,}000}{1{,}440} \times \frac{823}{293} = 19{,}000 \text{ cu. ft. per minute}$$

at 550° C. and 2 lb. pressure @ 0.018 lb. per cu. ft. = 342 lb. per minute = 493,000 lb. per 24 hours.

This steam would be derived from the exhaust of the steam driving the compressors.

In memoranda on the design of hydrogen plant the number of units chosen for 10,250,000 cu. ft. hydrogen was fifteen. Therefore for 3,000,000 about five would be required. As, however, the quantity of catalyst required has been found to be rather greater than there assumed, it would be necessary to install about eight converters and allowing for spare 10 would be installed. Each unit of plant would thus be represented by two converters.

The size of converter chosen is such that the gas passes through the catalyst at a velocity of about 15 ft. per second. The thermal balance of the conversion having been worked out, an efficiency of interchange of about 80-85 per cent. is found to be required. This can probably just be obtained without any preheating when once the plant is heated up. Large units are required, however, to bring this about. The catalyst would be prepared in the same plant as the ammonia synthesis catalyst.

The gas obtained amounts to 3,560 cu. ft. per minute and would contain about 0.03 per cent. of H_2S. This has to be removed before the gas passes to the fractional combustion catalyst, which appears to be rapidly effected by the presence of sulphur. Since the quantity of sulphuretted hydrogen is small it is probable that a layer of oxide contained in a cylindrical vessel of about 10 ft. dia. × 6 ft. deep, maintained at 120°, would be sufficient to remove the sulphuretted hydrogen before passing to the catalyst chamber, in which case the installation of oxide boxes, scrubbers, etc., would not be necessary between the two converters for the water gas catalysis and the fractional combustion respectively Indeed, it is possible a single protective layer in the fractional combustion catalyst unit would suffice. It would be best to try these matters out on the first unit that has been installed and actual large scale tests thereby obtained.

Thus for the first unit of plant, scrubbers, small gasholder and an extra oxide box measuring 30 ft. × 30 ft. should be installed, but they may not be found necessary for the whole plant.

Addition of Nitrogen as Flue Gas

At this stage the nitrogen would be added. The quantity of flue gas required would be 477,000 cu. ft. per 24 hours. Before being passed to this portion of the plant it would have passed through a scrubber to remove water vapour and it would contain 83.4 per cent. nitrogen and about 16.6 per cent. CO_2. The exact quantity to be added would be controlled by a valve in accordance with the indications of a diffusion meter, giving the percentage of hydrogen in the final gas proceeding to the ammonia synthesis plant. After addition of the nitrogen the resulting gas would have a composition of about

		cu. ft. at 20° C.
Hydrogen ...	57.3% ...	3,220,000
CO	2.1% ...	113,000
CO_2	30.2% ...	1,699,000
Nitrogen ...	10.4% ...	583,000

The remainder of the nitrogen required is added with the air during fractional combustion. The quantity of CO_2 to remove would be 1,699,000 cu. ft. = 86.5 tons per 24 hours = 135 lb. per minute.

Up to this point the methods of production of the gas are well established. At this stage, however, it is not yet quite clear what is the best method to choose to remove the CO, CO_2 and the sulphuretted hydrogen from the gas so as to leave behind the hydrogen and nitrogen in a pure state.

The gases must contain less than .0002 per cent. H_2S and not more than .002 per cent. of CO and of oxygen when they pass to the ammonia synthesis plant. The smaller the quantity of methane and argon the better, although they have no actual poisoning effect on the ammonia synthesis catalyst They tend, however, to accumulate in the circulation system and cause a waste of hydrogen and nitrogen, owing to the necessity of blowing off the gases from time to time to prevent accumulation of pressure in the system.

There are several ways in which the gas can be purified and the methods in each case are fairly thoroughly worked out, but which to choose and in what sequence relative to the rest of the process is a point which is not yet quite clear. To cite a few of the alternatives: Either at this stage (1) the gases can be washed with ammonia to remove the bulk of the CO_2 and H_2S and then taken through a catalyst along with the necessary quantity of air to preferentially burn the CO, the remaining CO_2 and sulphuretted hydrogen being removed by lime in boxes in the usual manner. The ammonium carbonate would be distilled by a process which has been worked out, whereby ammonia liquor is obtained and the CO_2 and sulphuretted hydrogen separated from it in a still. The ammonia liquor is then returned to the absorption system, which would consist of about three ring-filled scrubbers and a Whessoe; or (2) the gas can be taken direct through the fractional combustion converter after removal of the H_2S by hot oxide (in the manner described), then compressed to about 15 atms. and washed in ring-filled scrubbers with water first and then with ammonia liquor to remove the final traces of CO_2 and H_2S, the gas being then taken back to the compressor for delivery to the ammonia synthesis plant.

Gas Purification Schemes

Such a system would possess economic advantage, as the only extra cost is that for compression of the CO_2 contained in the mixed gases, which anyhow have to be compressed for the subsequent ammonia synthesis. On the other hand, it is important that some regulating and balancing device like the automatic by-pass used in gasworks should be arranged between the washing system and the rest of the ammonia synthesis unit, as the synchronisation of so large a plant would be difficult. The suggestion made is that the gas going to the ammonia synthesis unit should be controlled by a valve operating on the inlet main to the compressors, which would by-pass excess purified gases through an expansion engine so as to recover the power of compression. The mixed gas so expanded would pass to a gasholder feeding the compressors or to any storage gasometer for pure gas.

The alternative (3) to such a system is to wash out the CO_2 and H_2S before the fractional combustion catalyst by means of water under pressure, and then to let down the pressure, recovering part of the power by passing the whole of the gas through expansion engines. The CO would then be burned out by fractional combustion and the CO_2 produced would be passed through lime or ammonia for removal of the remaining CO_2 before the gases pass to the gasholder feeding the compressors. This system, however, is more wasteful of power. It would only be necessary if the CO cannot be removed completely by the fractional combustion in presence of the CO_2.

Of the three alternative schemes, No. 2 is the most economical, but if experiments do not lead to satisfactory confirmation of the removal of CO in presence of CO_2 the economic advantages of 1 and 3 must be compared, and data for these are available. In the normal course of events, therefore, it may be assumed the gas leaving the water gas catalysis plant will be metered. Nitrogen flue gas will be added and the two will pass through a balancing gasholder and proceed, after passing through the oxide boxes, to the fractional combustion plant situated in the same building as the water gas catalysis plant. Unlike the latter, the fractional combustion is best carried out in a fairly dilute gas; the heat of reaction is high and control of the temperature is important: it should be as near as possible 250°. It is thus of advantage to add the nitrogen at this stage.

Gas Passing to Interchanger

The volume of gas passing into the interchanger would be 5,615,000 cu. ft. (assuming the steam to be scrubbed out beforehand): the volume of air to be added would be about 565,000 cu. ft., allowing one vol. of oxygen per vol of CO, which removes also one vol. of hydrogen. The volume of steam required is equal to the volume of the gas, *i.e.*,

$$\frac{5{,}615{,}000 \times 543}{293} \times \frac{14.7}{16.7} = 9{,}150{,}000 \text{ cu. ft. at 2 lb. pressure,}$$

or at 0.0287 lb. per cu. ft. = 263,000 lb. or 182 lb. per minute.

The quantity of air and steam required would be controlled according to the readings of a CO indicator.

It is probable that the steam from the first catalyst unit could be retained in the gas, the whole being passed through a hot oxide box, so that this steam may not be required at all, but allowance should be made for it.

The number of compressors required would be about six, but it would be better to install eight, allowing two per unit.

As the percentage of CO in the gas is quite small after addition of the air, etc., it is probable one converter would be sufficient: thus there would be a spare converter for each unit of plant.

The gas is passed through interchangers in a manner similar to the first converter plant, the steam being added after passage through the first interchanger. The amount of heat produced will not be as great as calculated in the memorandum, as the gas in this case is diluted with a large quantity of CO_2. The same provision for removal of the heat will therefore not be necessary, and when once started the catalyst unit should keep itself going (and if there were insufficient heat a slight alteration in the composition of the flue gas added could be arranged to produce the required amount of CO to maintain temperature).

The gas, after condensation of the steam by two ring-filled scrubbers 10 ft. × 6 ft., would have a composition of about:

Hydrogen	3,107,000 cu. ft.	52.1%
CO_2	1,812,000 cu. ft.	30.4%
Nitrogen	1,035,000 cu. ft.	17.4%
	5,954,000 cu. ft.	

In both this catalysis and the water gas catalysis a preheating unit is necessary for starting purposes.

The gas passes finally to the gasholder (about 500,000 cu. ft.), which feeds the compressor plant.

This catalysis plant is very similar to a Grillo contact plant. It will not occupy a large area: the units can be therefore arranged in two rows, one for the water gas catalysis and the other for the fractional combustion, all in the same building. As there are practically no moving parts the actual maintenance and running costs ought to be low, but in order to obtain economic and autothermic working, skilled control will be required.

Compressor Plant

The compressors take the gases from the gasholder and compress them to 15 atm. pressure. The power required to compress 4,153 cu. ft. per minute in two stages to this pressure would be about 980 h.p.

The gas is then passed to the base of four steel scrubbers filled with pottery rings and through which in all about 2,300 gal. of water are passed per minute. The water dissolves out the CO_2.

The water after passing through a catch tank, which allows any entrained CO_2 to escape back to the scrubber, passes to Pelton wheels, where part of the power compression of the water between 60 and 70 per cent. would be recovered and where the CO_2 escapes to a flue. The water passes to a reservoir for recirculation.

The power required for pumping the water would be about 750 h.p., of which 450 is recovered, making in all about 300 h.p. Two 1,200 gal. multistage centrifugal pumps and one spare would be necessary for this service. These pumps would be driven by a motor (150 K.W.).

The gas is passed through the four scrubbers in parellel; two spare scrubbers would be provided. After passing through these scrubbers the gas passes through an ammonia scrubber, through which 5 per cent. ammonia liquor is circulated, which finally removes the last traces of CO_2.

The amount of ammonia which would be carried over would be small and it does not matter if it passes to the catalyst plant, but it might be more convenient to remove it, and therefore a small water scrubber could be installed after the ammonia scrubber.

It would probably be best to use two ammonia scrubbers in series, which would effect complete removal of CO_2 and H_2S.

The gas leaving the scrubbers would have a free volume and composition at 20° C. and normal pressure as follows:—

Hydrogen:

$$3{,}107{,}000 - 11.2 \text{ atms.} \times 0.0177 \text{ (sol. coef.)} \times 368 \text{ c.f.} \times 1{,}440 = 3{,}002{,}000.$$

Nitrogen:

$$1{,}035{,}000 - 3.8 \times 0.0164 \times 368 \times 1{,}440 = 1{,}002{,}000.$$

Total ... ... 4,004,000.

Allowing, therefore, for loss in process of washing, etc.,

2,580,000 cu. ft. of hydrogen, and 860,000 cu. ft. of nitrogen = 3,440,000 cu. ft. assumed total volume.

The volume at 15 atm. would therefore be between 267,000 and 229,000 cu. ft The gas is then compressed from 15 to 152 atm. in two stages, requiring between 543 h.p. for the larger quantity and 466 h.p. for the smaller (compressors at 90 per cent. mechanical efficiency).

Before such compression the regulating device already mentioned could be inserted, so that the process might be balanced throughout. The compressors themselves would be automatically governed and controlled to maintain a uniform pressure. They would be operated by direct-coupled 3-crank engines receiving steam at 160 lb. per square inch pressure. Either three 1,500 cu. ft. machines would be required or five 1,000 cu. ft. machines, and allowing for spare machine four of the first type or six of the second would be required. For convenience the larger machine would be more suitable, as then one machine would operate one unit. The compressors would be water lubricated.

The gas passes next to the ammonia synthesis plant under a pressure of 152 atm.

(To be continued.)

West Cumberland Society of Chemists and Engineers

Coalfields and the Survey Laboratories

THE Fuel Research Board Survey is now in progress in all the principal coalfields of Great Britain, said Dr. John H. Jones in a paper read before the West Cumberland Society of Chemists and Engineers at Workington, on October 18. In the main, the survey laboratories are concerned with small-scale work, investigations requiring large-scale plant being passed on to the Fuel Research Station which is specifically designed for the purpose.

The organisation of the survey and the methods of working were briefly described, and reasons given explaining why it is considered, in the beginning, preferable to survey seam by seam by means of a series of pillar samples, rather than by analysis of the commercial output of collieries. The survey of a coalfield is carried out systematically seam by seam, the order in which the seams are to be studied being decided by the local committee. The particular seam chosen is sampled at a number of points throughout the area by means of pillar and channel samples distributed according to the discretion of the local survey officer. Reports on each individual sample are submitted and discussed with the particular colliery concerned and ultimately a complete report on the seam is presented to the local committee for discussion. After approval by the committee, it is then published as an official Fuel Research Survey Paper.

Permanent Basis of the Survey

In general, the results obtained by such a survey are not directly applicable to commercial practice, in that they do not present an account of the purity of the coal as it is actually marketed; thus the ash content of a pillar sample is less than the ash of the run-of-mine coal and may be less than, or, in some cases, greater than, the ash of the final product. The survey figures aim at the presentation of the quality and the character of the coals as they occur in the ground. This is a permanent basis and the figures obtained by a survey of this character will be reliable and valuable until the seam is exhausted.

It should be emphasised that it is obviously preferable to study the individual seams before surveying the blends which compose the marketable product. The examination of commercial samples must therefore be taken as an important, but nevertheless subsidiary, side of the survey. Considerable progress has, however, been made in this direction and reports have been published giving details of over 360 grades of South Yorkshire coal and over 100 grades of Lancashire coal. This branch of the work is also in progress in the Nottingham and Derbyshire coalfield.

Over 100 samples of the Busty seam were examined and from these it has been possible to construct a map showing volatile matter contours, or "isovols." The volatile matter figures are all calculated to the "dry, ash-free" basis and, whenever necessary, are corrected for carbon dioxide, originally present as carbonates in the inorganic constituents. A casual inspection of the map shows that despite the number of samples, the contours are largely presumptive and can only be used to indicate the probable trend of volatile matter content. It is also obvious that for such maps, a uniform geographical distribution of samples is not desired, the majority of points being required in those areas where the character of the seam changes most rapidly. It will be realised that a concentration of samples in these areas may not be in accord with other requirements of the survey, it being desirable, though not always possible, to take the largest numbers of samples from the areas where the reserves are greatest.

In regard to the variation of ash fusion points with blending and washing, this was not an attempt at any generalisation but an account of work carried out in connection with a specific problem. Dr. Jones said that in one locality in Durham a first-class foundry coke is made from a blend of three seams, the Brockwell, Busty and Victoria. The ash fusion points of the Brockwell and Busty seams are high, but the Victoria ash is readily fusible. The reserves of the Brockwell and Busty seams are small, and the question arises as to how much of the Victoria seam can be added to the blend before the fusion point becomes too low for a first-class coke. The effect of cleaning on the Brockwell and Victoria seams has been studied as also has the effect of blending cleaned and uncleaned coals.

Phosphorous Problems

A considerable amount of attention has been paid to the subject of phosphorus. Phosphorus surveys have been carried out in one or two localities where trouble has been encountered due to irregularities in phosphorus content; the determination has also become a matter of routine for all subsections of samples from the Cumberland area, where the phosphorus content is a matter of great importance. It was brought to the notice of the survey that in some cases where a sudden increase was obtained with Durham coals, normally of low phosphorus content, the increase was due to the presence of lenticles of fusain and shaly fusain which were abnormally high in phosphorus. Many samples have been examined and it now appears that the phosphorus content of fusain covers a range far wider than that of coal, some fusains containing less than 0.008 per cent. of phosphorus, whilst others yield figures as high as 6.0 per cent. The highest figures have always been obtained from lenticles of shaly fusain which contain up to 50 per cent. of ash.

With the high phosphorus shaly fusains the control must be rigid. In one instance a coal with a normal phosphorus content of 0.01 per cent. contained lenticles of shaly fusain with 27 per cent. of ash and 2.28 per cent of phosphorus in fusain, so that the presence of 0.5 per cent. of such lenticles in the marketable product would double the phosphorus content of the coal. Fortunately, high phosphorus fusains are not general, but sufficient instances have been recorded during the past year in the Durham coalfield to indicate that the position must be carefully watched.

Gravity Separation

By a carefully controlled gravity separation it is now possible to separate a coal into fractions which not only differ in ash content, but may differ quite considerably in chemical composition. The work has been applied to samples of durain, clarain and vitrain and has shown that durain and clarain cannot be considered as entities.

A study has been made of the ashes of some coals of abnormally low ash content obtained from fossilised tree trunks, known locally as "cauldron bottoms." The coal can be readily cleaned to less than 1 per cent. of ash and the ash so obtained contains an abnormally high percentage of titanium. The concentration of titanium oxide is not due to the washing, for a sample obtained from the same area as some of the cauldron bottoms was washed down to an ash content of less than 1 per cent., and the ash found to contain 1.65 per cent. of titanium.

A Study of Pigment Particles

Presidential Address to the Oil and Colour Chemists' Association

THE 1935-36 session of the Manchester Section of the Oil and Colour Chemists' Association was opened by the president of the Association, Mr. G. A. Campbell, M.Sc., before a well-attended meeting in the Reynolds Hall, College of Technology, Manchester, on October 11, when the president gave an address on "Pigment Particles."

The subject of the surface properties of pigment particles, said Mr. Campbell, becomes of more and more importance as time goes on, and yet in the works it is only very casually considered in processing. Nowadays one almost invariably finds a qualified chemist in charge of the works where precipitation processes are carried out, and yet drying and grinding are often left to look after themselves without much supervision at all. It would pay firms catering for a wide variety of consuming interests to pay much more attention to the physical condition of the powders they sent out.

Differences in Surface Properties

Pigments vary enormously in their surface properties, for example, according to whether they are finished off by grinding or by pulverising. In the former process the particles become smooth and regular, whereas in the latter they are pointed and irregular, and the newly formed surfaces are in a condition of greater re-activity. The one or the other may be desirable in any particular case—the important matter is to realise the difference and appreciate its extent. A certain confectionery manufacturer grinds his icing sugar on a Kek mill. If he packs straight from the mill the next day it is set hard like a rock and simply wants breaking up and re-grinding. After much experimental work by a system of trial and error, he found that if the sugar after grinding was passed over a fine silk screen with vibration before packing, it would remain a fine powder for weeks in stock. In this case the material is bulked more after the screening process and the explanation of the increased stability is probably that a certain absorption of air has occurred forming cushions to prevent cohesion of the particles.

Another interesting case comes from the baking world where monocalcium phosphate baking powders which are deliquescent are protected from moisture by admixture with starch, and it is well known in the trade that the phosphate must not be too fine nor the starch too coarse. The explanation here is due to one of the general properties of mixed powders. It is frequently assumed that if a very fine powder is mixed with a moderately fine powder, the very fine powder will fill in the voids of the coarser powder, but this is not so. The fine powder tends to coat the particles of the coarser powder, and hence the non-deliquescent starch coats and protects the deliquescent baking powder. In many industries the specific surface and particle size and shape must be just right to give the best results, particularly in the hardening of steel, and in the silver bromide grain used in photography. More attention might be paid to the question in the colour trade, and with the increasing variety of colour consuming trades it becomes incumbent upon pigment manufacturers to study the general properties of powders, apart altogether from *pigment* powders so as to meet all eventualities.

Paint Film Weathering

Some very instructive work on the influences of the pigment (zinc oxide) in paint film weathering has been done by H. A. Depew ("Ind. Eng. Chem.," August, 1935). Here it was shown that the surface properties, size and shape, were of greater importance in developing a stable film than the re-activity of the zinc oxide with the free acids of the medium, or than the resistance to short wave-lengths of light. Of the various forms examined, it was found that the form most to be preferred is in large coarse needles. These particles favoured a condition of separating from vehicle to form minute vacuum pockets on drying, just sufficient to form microscopic failures which relieve the stresses and strains set up in the drying film and still prevent the failures becoming visible. The shape and the size of the pigment, therefore, are shown to be of first-class importance, and, while most of the investigation work as to separation of pigment from vehicle at these newly-formed vacuum pockets has been done in the rubber industry, the results are shown to have this very definite application in paint manufacture. Incidentally these vacuum pockets so desirable in paint, according to this investigation, are undesirable in rubber, and it is interesting to note that this needle-shaped zinc oxide, which has developed the maximum weathering properties in paint, is the least useful make in rubber. Here we have a development, therefore, among the zinc oxide manufacturers of the adaptation of the surface properties of the pigment to each particular usage, which it will be remembered was foretold would tend to be the policy of the mass production pigment manufacturers, following the example of the carbon black makers over the past year or two.

Some of the conditions for obtaining these desirable microscopic separations were interesting and cut across certain preconceived ideas on the subject, namely, the use of irregularly shaped particles, and of a proportion of coarse particles, not *too* complete mixing with the vehicle, so that microscopic groups of fines are not completely incorporated. That is to say, dispersion assumes a new and less important place in the technology of paint making.

The Need for Simple Texts

It is not uncommon works experience after matching up a required sample satisfactorily in all the usual colour aspects —shade, tint, strength, light fastness, etc., that it is still not acceptable to the customer for some less accessible property, such as bulking value, specific gravity, fineness, texture, wettability, or oil absorption. It is very desirable, therefore, to have some simple test which would give warning of such differences so that steps may be taken to counter them. First of all, it should be noted that certain of these differences are fundamental conditions—particle size, shape and distribution, while others are the consequences of these fundamentals, *e.g.*, texture, bulking value, oil absorption Texture, for instance, is due to the hardness and the shape of the particles quite apart from their size and distribution Bulking value depends on the shape of the particles, and the absorbed layer of gases (air). Oil absorption itself is connected with particle size, size distribution, shape, interfacial tension, specific surface, etc. It would appear, therefore, that any variation in these properties which are quoted together as surface properties would show up as variations in the oil absorption figures, or the liquid absorption figures.

Oil Absorption Tests

Oil absorption tests should take place far more than they do in routine testing of pigment powders. Unfortunately, they are still regarded as something of a guide to the amount of oil required in making up a given pigment into an oil paste or ready mixed paint, and as such they are usually a very poor guide. If used, however, as a guide to the surface conditions ruling in that particular pigment powder, and compared with some other pigment or pigments, to give simply a number which will indicate a similarity or a difference—in this way the liquid absorption figure is very informative, and once the difference is detected the fundamental cause of it can be tracked down or the trouble can be overcome by treatment. It is this use of the test which justifies the Gardner-Coleman method, which otherwise has no real relation to oil absorption in works practice. The standard rub-out method has some relation with works practice though not a direct simple one, but the works process of mixing with pressure is faithfully carried out and the wetting out property is made full use of by getting the powder in a tightly packed condition under the knife. The Gardner-Coleman method minimises the wetting out effect by keeping the powder always in a loose condition.

Mr. Campbell concluded his address by comparing various methods of expressing conveniently the particle size distribution in various powders, so as to convey comparative pictures of each, and to obtain a simple number to express the approximate specific area of each.

Notes and Reports from the Societies

Society of Public Analysts

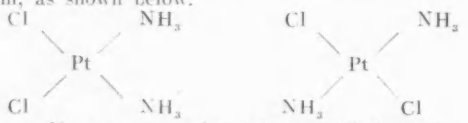
Forthcoming Papers

THE next meeting of the Society of Public Analysts will be held on Wednesday, November 6, at the Rooms of the Chemical Society, Burlington House, Piccadilly, W.1, at 8 p.m., when the following papers will be read: "Characteristics of Halibut Liver Oils," by R. T. M. Haines and J. C. Drummond, D.Sc., F.I.C.; "Notes on Mendel and Goldschieder's Method for Determining Lactic Acid in Blood," by R. Milton, B.Sc.; "The Application of Controlled Potential to Microchemical Analysis," by A. J. Lindsey, M.Sc., A.I.C., and H. J. S. Sand, D.Sc., Ph.D., F.I.C.; "The Micro-Electrolytic Determination of Bismuth and Lead and their Separation by Graded Potential," by A. J. Lindsey, M.Sc., A.I.C.

Chemical Society

Liverpool: Recent Advances in Stereochemistry

DR. WARDLAW, in a paper which he delivered to the Liverpool Section of the Chemical Society on October 18, said that as early as 1845 it was known that two isomeric diamines, $PtCl_2.2NH_3$ existed. These were represented by various formulæ from time to time, but Werner, in 1893, was the first to suggest that this was a case of planar *cis-trans* isomerism, as shown below.



In 1920 Vernon prepared two forms of $PtI_2.2CH_3$ and proposed a similar explanation. Direct evidence of the planar configuration of platinum and also of palladium was provided in 1922 by R. G. Dickinson from an X-ray investigation of K_2PtCl_4 and K_2PdCl_4, while in 1927 Kraus and Brodkorb considered that they had obtained chemical evidence for planar 4-covalent palladium from the amines of palladous chloride. From 1925 onward, however, various pieces of evidence were brought forward by Reihlen in favour of the tetrahedral disposition of the valencies in platinum, palladium and nickel compounds. Moreover, in 1929, Drew proved that the original argument for the planar structure of $PtI_2.2CH_3$ was worthless, and in 1932 Kraus and Brodkorb's conclusions regarding 4-covalent palladium were shown to be incorrect.

Following a theoretical paper by Pauling (1931) evidence began to accumulate once more in favour of planar configurations for bivalent platinum and palladium, and Pauling's prediction that 4-covalent nickel should also be planar (and diamagnetic) appeared to be supported by the isolation by Sugden (1932) of two diamagnetic compounds of nickel with benzylmethylglyoxime. In 1932, X-ray examination disclosed that in the tetramine $Pt(NH_3)_4Cl_2.H_2O$ the four nitrogens are co-planar with the platinum atom, whilst a study of cooperite by the X-ray method showed also a planar distribution of platinum valencies (Bannister). In recent years it has been proved by chemical and X-ray studies that many four-co-ordinated derivatives of bivalent platinum, palladium and nickel possess a planar configuration, and in view of the diverse nature of the compounds studied there can be no doubt that this configuration is quite general, and can only be modified in very special cases such as may occur with ter- or quadri- dentate groups. In this connection it should be noted, however, that from recent X-ray examinations of some exceptional compounds of this type, *viz.* [Ni.tren] $(SCN)_2$, etc., where [tren = $N(CH_2CH_2NH_2)_3$] no evidence has been obtained which is incompatible with the view that these are actually six-co-ordinated non-ionised derivatives.

Recently it has been recorded that the four covalent compound $Pt(CH_3)_3Cl$ in which the platinum is quadrivalent, the configuration is tetrahedral, so that it appears possible that the principal valency of an atom may be the deciding factor for its configuration. Finally, during recent investigations of quadricovalent copper compounds it has been demonstrated that four covalent copper is also planar.

Manchester Metallurgical Society

Presidential Society

IN his presidential address to the Manchester Metallurgical Society on October 16, Mr. L. E. Benson dealt with the generation of internal stresses in materials on heating and cooling. The principle governing the temperature and stress distribution in steel parts were discussed and examples given, the latter including such widely different parts as large alternator rotor forgings, large steel flywheels, hardened and tempered, parts of moderate size and small parts such as tools and magnets used in the hard condition. Attention was drawn particularly to the danger of water quenching alloy steel forgings after tempering. The author also predicted that in the future heat treatment operations would be deliberately designed to produce internal stresses of a beneficial kind.

Institution of Chemical Engineers

Associate-Membership Examination

NINE candidates presented themselves at the tenth public examination in chemical engineering arranged by the Institution of Chemical Engineers. The board of examiners states in its report that the method of examination was on the same lines as in 1934, and the general arrangement and choice of questions were the same as in previous years, with the exception that, in accordance with the recommendation of the examiners of the previous year, the number of drawings required in the "home paper" was reduced.

In 1934 the examiners recommended that a higher standard of drawing should be required. Acting on this recommendation, one of the candidates this year is being required to take the drawing paper only in a future examination.

The following candidates satisfied the examiners: B. Edgington, B.Sc., A.I.C., Nottingham; D. K. Moore, B.Sc., West Hartlepool; L. H. Phillips, Runcorn; E. H. Smith, M.A., A.I.C., Acton, Ontario; H. H. Turner, Rochester; and H. Verschoor, London.

The William Macnab Medal, for the best set of answers submitted, has been awarded to D. K. Moore. This is the first award of this medal.

Society of Chemical Industry

Plastics Group: Plastics in Architecture

"WE are approaching an age of steel, glass, concrete and plastics, but we are still searching for new formulæ to give expression to these materials, so as to use each material to its best advantage," said Mr. Grey Wornum, F.R.I.B.A., in a paper read before the Plastics Group of the Society of Chemical Industry on October 15. The general title of his address was "What the Architect Requires of Plastic Materials."

By means of lantern slides, Mr. Wornum put forward numerous suggestions for possible application of plastics in architecture. In exhibiting an illustration of a complete kitchen in which the table tops, cupboard handles, and door coverings were of laminated plastics, he said that, whilst the price was not yet quite right for the latter application, the draining board might well have been plastic. He also showed a variety of examples of radiator grills and decorative screens which could be of plastics if a suitable material was provided.

Turning to immediate practical uses for plastics the speaker showed some views of the interior of a hospital. In talking of these he suggested an important opportunity for plastics, namely, window glazing beads. These consisted of small strips of metal or wood, and were used in holding in the glass in windows, where the original system of puttying was not considered suitable. If made of wood and painted or varnished, the paint wore off, and the wood rotted and cracked. If made of steel, the metal was apt to rust when the paint came off, which it did in a short time owing to the cleaning of the windows. If they could be made of plastic material, so that they were cleanable and attractive in any colour, they could be a great contribution towards the modern window.

An I.C.I. Workman's Compensation

Application Adjourned Sine Die

A WORKMAN'S compensation case came before Deputy Judge Morris at the Widnes County Court on October 18, when Imperial Chemical Industries, Ltd., applied to determine or diminish a payment of 30s. a week to Thomas Edward Southern, of Widnes. Mr. Basil Nield supported the application, and Southern was represented by Mr. England.

Mr. Nield said the ground of the application was that Southern had not been incapacitated as the result of dermatitis. The answers put in were a denial of recovery and that there was no change of circumstances. Southern had been employed by the applicants for many years from 1920. On May 8, 1923, he started work at the Pilkington-Sullivan Works in the di-nitrochlorbenzene department. He was off work for three short periods up to 1924 owing to dermatitis and was paid compensation. On February 3, 1924, Southern took on entirely different work as a general labourer in the non-organic section of the works. At no time since 1924 had he been employed in any section of the works that was likely to give rise to any condition of dermatitis. On April 4, 1934, Southern ceased work by reason of skin condition. He was examined by Dr. McKenna, who held the view that he was not suffering from occupational dermatitis. That view was confirmed by the certifying surgeon for the district, Dr Albert Jones. An appeal went before the medical referee, who certified that Southern was suffering from occupational dermatitis. Upon that, compensation at the full rate was paid as from April 5. Since then he had been periodically examined and in March, 1935, he was offered his old work as a platelayer's labourer in the non-organic section. On May 17, 1935, he was examined by Dr. Mumford, skin specialist and dermatologist, of Manchester, who found no trace of occupational dermatitis.

Southern said he had worked for Imperial Chemical Industries almost continuously since he was 13. When he was employed as a platelayer's labourer part of his duties were to act as brakeman and that brought him near the processes. There was plenty of burnt ore dust about and some days his face was brown with dust. The rails were laid on burnt ore and when wagons were being discharged with spades there was plenty of dust. He did not want to go back to work in the dust because it gave irritation and he could not sleep at night for it. If offered work apart from the dust he would go back even though it would be less money.

Mr. England said it seemed a pity that a great firm like Imperial Chemical Industries could not offer a different job. There was strong evidence that if an old employee of 30 years' service could not get a light job with his old firm there were no light jobs available in the district.

Mr. Nield said the applicants were prepared to agree to a declaration of liability. The action of the employers, he submitted, was far from being inhuman.

His Honour said there was considerable danger if he went back to the same work he would be off again; in other words it was not suitable employment. He asked if his employers could find him some other sort of work.

Mr. Nield said it was impossible to give a definite undertaking at the moment, but Imperial Chemical Industries in their desire to assist would see if they could find work other than that described.

The case was adjourned sine die.

The National Lubricating Oil and Grease Federation

The Evil of Unbridled Price Cutting

MR. H. C. R. WILLIAMSON, of Lobitos Oilfields, Ltd., speaking at the annual dinner of the National Lubricating Oil and Grease Federation, at Grosvenor House, Park Lane, London, on October 16, said the oil industry was suffering from the result of its own follies. By all means have competition; but unbridled price-cutting was no good to anyone in the long run. Surely prices should bear some relation to the merits and importance of the article sold. Members of the Federation could help to improve matters if only they would have the courage to ask a reasonable return for service and quality, and paid less attention to what the other fellow was going to do.

The consumption of lubricants was increasing, mechanism was being improved, and a higher standard of oil products was demanded, yet prices were at a miserably low level. This was not due to lower prices of crude oil, because, while it was true that the average c.i.f. value of imported crude in 1934 was some 9 per cent. lower than the 1932 average, the reduction in the case of lubricating oils was 22.8 per cent. in 1934 as compared with 1932. It behoved all concerned to support the Federation in its attempt to get the lubricating oil and grease trade on to a better footing. No one wished to squeeze the consumer, but Mr. Williamson believed they all recognised that the consumer was getting too good a deal at their expense. The return to the lubricating oil trade was entirely inadequate. An enormous amount of capital and brains had been put into the industry, and they should see that their efforts made were productive; otherwise they were in danger of imitating the partridge of the prophet Jeremiah, which "sitteth upon eggs and hatcheth them not."

Mr. W. BLACKWELL, of the W. Blackwell Oil Co., president of the Federation, said that if people would be firm and would confine themselves to the districts in which they were situated, better prices would be obtained by the distributors. They were, or should be, rendering more efficient service than merely supplying lubricants; they should be giving advice and help to the consumer in his many troubles, and they should be reaping at any rate moderate remuneration for the services they rendered. They were out not merely to sell oil but to sell lubrication and service, and he believed that if the poaching of some distributors into the districts of others could be terminated better prices would be obtained

Mr. E. B. IRWIN, vice-president, proposed the health of the Federation's guests and visitors, amongst whom were representatives of the directorates of new refineries established in this country, employing British labour and canning their products in British containers.

Dr. E. F. ARMSTRONG, responding on behalf of the guests, expressed gratitude for their reception—interpreting the word "gratitude" in the Scottish sense, *i.e.*, an appreciation of favours to come. Next to the gentleman of whom Omar Khayyám had spoken so feelingly, he could think of no finer trader than the gentleman who somehow or other mediated in the transference of lubricating oils from the refiner to the user. The members of the Federation represented almost the noblest of all professions. No machine could turn without they had a hand in its turning; if they had no hand in its turning it would jam, and the consequences would be dreadful. In other words, the life we led would be impossible, certainly it would be impossible to enjoy it without their help, for all industry was based on their doings. He could not help reflecting upon the difficulties which must beset them, in common with all people engaged in industry, when comparing life as it was to-day with that of a generation or so ago, when their fathers had founded those great businesses in which they sat back and reaped the profits to-day. Britain to-day was faced with all sorts of difficulties, but we had one great asset in the sterling character of the British commercial man and the British industrialist, which enabled the Britisher still to hold his place in the world.

Continental Chemical Notes

Spain

A GLASS-MAKING COMPANY has been formed in Bilbao under the style of Vidriera de Llodio.

Norway

IT IS PROPOSED TO INCREASE the output of molybdenum ore at the Kaarben Mines up to an annual figure of 500 tons About 150 workers are employed at the mines.

Russia

THE FIRST EXPERIMENTAL ALCOHOL PLANT using naphtha gas as raw material entered production on September 5, 1935, when the first 100 kg. of alcohol were delivered. It is understood that the gas reserves available in the Baku district will suffice for an annual output of either 4,000 to 5,000 tons alcohol or 13,000 to 15,000 tons synthetic rubber.

Holland

IN CONNECTION WITH THE EXTENSIONS now in progress at the Tin Refinery of the Billiton Maatschappij, a contract has been arranged with the Lijm-en Gelaticnefabriek, of Delft, to supply the hydrochloric acid required by the Arnhem factory. This announcement signifies abandonment of the original intention to produce hydrochloric acid at the latter works. Germany was formerly the principal source of the acid.

Roumania

THE ASTRA ROMANA PETROLEUM CO. is operating a liquid butane plant at Ploesti with an annual capacity of 7,000 tons. The plant utilises natural gases formerly running to waste.

Sweden

WOODEN CONSTRUCTIONAL PORTIONS OF THE CANAL recently opened to traffic at the Sote Fjord were coated with a protective layer of "arsenic concrete." This material was produced by the process of the Boliden Mining Co. and comprises arsenic, cement and sand in the ratio of 1 : 3 : 12.

Bulgaria

ACCORDING TO AN OFFICIAL REPORT pyrethrum cultivation trials in the last few years have given promising results. It is understood that a firm American offer has been lodged with the Ministry of Agriculture for purchase of an unlimited quantity of pyrethrum with a pyrethrin content of 0.9 per cent. For plants with a pyrethrin content of 1.2 per cent. special premiums above the market price will be paid to the producers. Even higher percentages have been achieved in Southern Bulgaria near Philipopel and Kritschim. The total area under pyrethrum cultivation this year is 100 hectares and government experimental stations at Kasanlik and Philipopel are assisting cultivation by distributing seed ("Chemische Industrie").

Personal Notes

MR. F. G. PALIN has been appointed a director of the British Metal Corporation.

MR. J. C. HUGHES, of Holywell, was appointed science master at Pwllheli County School on October 18 out of 150 applicants.

MR. W. E. S. LUNN, managing director of the Bridge Croft Dyeing Co., Ltd., who died last week, was buried at Huddersfield on October 22.

MR. THOMAS GOULDER, a director of the Gas, Light and Coke Co., who died last week, was buried at Ingatestone, Essex, on October 22.

SIR HAROLD HARTLEY delivered the second Hinchley Memorial Lecture of the Institution of Chemical Engineers on October 25, on the subject of "Our National Coal Resources."

PROFESSOR LAPWORTH has retired from the Sir Samuel Hall Chair of Chemistry at Manchester University after a long and distinguished career.

SIR FRANK MEYER, deputy-chairman of De Beers Consolidated Mines and director of African Explosives and Cape Explosive Works, Ltd., died on October 19, as a result of injuries received in a riding accident.

DR. FENG-YUN O, a Chinese woman scientist, has evolved a process by which rayon may be manufactured from millet. The discovery may revolutionise the manufacture of cheap rayon.

DR. W. H. BRINDLEY read a paper on "Thomas Percival and some other early members of the Manchester Literary and Philosophical Society," to the Society, on October 22. Dr. Brindley made several references to early experiments with cod liver oil.

MR. G. W. LEE, a prominent figure in Yorkshire dyeware and chemical circles, died last week and was buried at Mirfield on October 19. He had been for many years the head of the sales staff of the Yorkshire Dyeware and Chemical Co., Ltd., and was associated with the Calder Dyeware Mills, Dewsbury.

MR. T. HARRY HEWLETT, chairman and managing director of the Anchor Chemical Co., Clayton, and of Joseph Anderson and Sons, Ltd., Bank Street, Chemical Works, Manchester, has notified the Clayton Conservative Association of his "willingness to consider favourably" an invitation to become National Conservative candidate in the General Election.

MR. WALTER MILLINGTON, an analytical chemist, of Runcorn, left £1,169, with net personalty £1,139.

MR. M. STERN, B.SC., who was an analytical chemist, died in East Ham Hospital on October 21.

MR. G. D. DELPRAT is the first recipient of the bronze medal of the Australian Institute of Mining and Metallurgy.

SIR JAMES JEANS delivered the Halley Stewart Lecture in London on October 22.

MR. E. ROBINSON, director of Scott and Turner, Ltd., manufacturing chemists, left £57,544, with net personalty £54,889.

MR. D. R. MOORE, B.SC., winner of the William Macnab Medal awarded by the Institution of Chemical Engineers, has taken up a position with Cerebos, Ltd.

MR. GEORGE BADDELEY, M.Sc., Ph.D., has been appointed assistant lecturer in organic chemistry at Manchester University.

LORD RUTHERFORD OF NELSON, O.M., F.R.S., and SIR FREDERICK GOWLAND HOPKINS, P.R.S., will have the degree of Doctor of Science conferred upon them by Reading University on December 2.

MR. RAMSAY MACDONALD, who opened the new coal-oil plant at Billingham for Imperial Chemical Industries, Ltd., is to be asked to open another plant for a similar purpose at Seaham for Coal and Allied Industries, Ltd.

MR. A. E. FINDLEY, head of the chemistry department of the Liverpool Central Technical School, presided at the inaugural dinner of the University of Birmingham Guild of Graduates, held in Liverpool on October 21.

LORD READING, LORD MELCHETT and SIR HARRY MCGOWAN, of Imperial Chemical Industries, Ltd., have been appointed members of the committee of patronage organised by the Federation of British Industries for the British Pavilion at the Levant Fair, 1936. At last year's Fair the Federation undertook the organisation of the British pavilion, but owing to the great amount of work it has undertaken in connection with the Empire Exhibition to be held at Johannesburg next year it has been unable to accede to the request of the Levant Fair authorities to do the same next year. The committee of patronage will, however, answer general inquiries regarding the Fair from firms in this country.

Chemical and Allied Stocks and Shares

Current Quotations

THE following table shows this week's Stock Exchange quotations of chemical and allied stocks and shares compared with those of last week. Except where otherwise shown the shares are of £1 denomination.

Name.	Oct. 22.	Oct. 15.
Anglo-Iranian Oil Co., Ltd. Ord.	64/4½	62/6
,, 8% Cum. Pref.	34/6	34/6
,, 9% Cum. Pref.	35/6	36/6
Associated Dyers and Cleaners, Ltd. Ord.	2/6	2/6
,, 6½% Cum. Pref.	5/3¾	5/3¾
Associated Portland Cement Manufacturers, Ltd. Ord.	58/-	57/-
,, 5½% Cum. Pref.	27/-	27/-
Benzol & By-Products, Ltd. 6% Cum. Part Pref.	2/6	2/6
Berger (Lewis) & Sons, Ltd. Ord.	61/3	62/6
Bleachers' Association, Ltd. Ord.	6/3	6/10½
,, 5½% Cum. Pref.	10/-	11/3
Boake, A., Roberts & Co., Ltd. 5% Pref. (Cum.)	20/-	20/-
Boots Pure Drug Co., Ltd. Ord. (5/-)	47/9	47/9
Borax Consolidated, Ltd. Pfd. Ord. (£)	97/6	97/6
,, Defd. Ord.	16/9	16/9
,, 5½% Cum. Pref. (£10)	£11	£11
,, 4½% Deb. (1st Mort.) Red. (£100)	£109	£109
,, 4½% 2nd Mort. Deb. Red. (£100)	£104	£104
Bradford Dyers' Association, Ltd. Ord.	8/9	8/9
,, 5% Cum. Pref.	11/10½	11/10½
,, 4% 1st Mort. Perp. Deb. (£100)	£88	£88
British Celanese Ltd., 7% 1st Cum. Pref.	24/9	25/6
,, 7½% Part. 2nd Cum. Pref.	22/-	22/-
British Cotton & Wool Dyers' Association Ltd. Ord. (5/-)	5/3	5/3
,, 4% 1st Mort. Deb. Red. (£100)	£90	£90
British Cyanides Co., Ltd. Ord. (2/-)	3/-	3/1½
British Drug Houses, Ltd. Ord.	20/-	20/-
,, 5% Cum. Pref.	21/3	21/3
British Glues and Chemicals, Ltd. Ord. (4/-)	6/3	6/3
,, 8% Pref. (Cum. and Part.)	27/6	27/6
British Oil and Cake Mills, Ltd. Cum. Pfd. Ord.	46/3	46/3
,, 5½% Cum. Pref.	26/3	26/3
,, 4¼% First Mort. Deb. Red. (£100)	£106/10/-	£106/10/-
British Oxygen Co., Ltd. Ord.	107/6	106/3
,, 6½% Cum. Pref.	32/6	32/6
British Portland Cement Manufacturers, Ltd. Ord.	96/3	95/-
,, 6% Cum. Pref.	29/-	29/-
Bryant & May, Ltd. Pref.	66/3	67/6
Burt, Boulton & Haywood, Ltd. Ord.	17/6	17/6
,, 7% Cum. Pref.	27/6	27/6
,, 6% 1st Mort. Deb. Red. (£100)	£105/10/-	£105/10/-
Bush, W. J., & Co., Ltd. 5% Cum. Pref. (£5)	108/9	108/9
,, 4% 1st Mort. Deb. Red. (£100)	£96/10/-	£96/10/-
Calico Printers' Association, Ltd. Ord.	8/9	8/9
,, 5% Pref. (Cum.)	12/6	12/6
Cellulose Acetate Silk Co., Ltd. Ord.	13/1½	12/6
,, Deferred (1/-)	2/4½	2/1½
Consett Iron Co., Ltd. Ord.	10/6	11/-
,, 8% Pref.	27/6	27/6
,, 6% First Deb. stock, Red. (£100)	£106	£106
Cooper, McDougal & Robertson, Ltd. Ord.	32/6	32/6
,, 7% Cum. Pref.	28/9	28/9
Courtaulds, Ltd. Ord.	53/9	53/1½
,, 5% Cum.	24/4½	25/-
Crosfield, Joseph, & Sons, Ltd. 5% Cum. Pre Pref.	25/-	25/-
,, Cum. 6% Pref.	28/9	28/9
,, 6½% Cum. Pref.	29/4½	29/4½
,, 7½% "A" Cum. Pref.	30/-	30/-
Distillers Co., Ltd. Ord.	92/-	91/-
,, 6% Pref. Stock Cum.	31/-	30/6
Dorman Long & Co., Ltd. Ord.	19/6	19/6
,, Pref. Ord.	27/6	28/6
,, 6½% Non-Cum. 1st Pref.	23/-	22/6
,, 8% Non-Cum. 2nd Pref.	19/6	20/9
,, 4% First Mort. Perp. Deb. (£100)	£102/10/-	£102/10/-
,, 5% 1st Mort. Red. Deb. (£100)	£103	£103
English Velvet & Cord Dyers' Association, Ltd. Ord.	3/9	4/4½
,, 5% Cum. Pref.	8/9	8/9
,, 4% First Mort. Deb. Red. (£100)	£70	£70
Fison, Packard & Prentice, Ltd. Ord.	38/9	38/9
,, 7% Non-Cum. Pref.	31/3	31/3
,, 4½% Debs. (Reg.) Red. (£100)	£106	£107
Gas Light & Coke Co., Ord.	26/9	26/6
,, 3½% Maximum Stock (£100)	£90	£90
,, 4% Consolidated Pref. Stock (£100)	£106/10/-	£106/10/-
,, 3% Consolidated Deb. Stock, Irred. (£100)	£85	£86
,, 5% Deb. Stock, Red. (£100)	£116	£116
,, 4½% Red. Deb. Stock (1960-65) (£100)	£114	£114
Goodlass Wall & Lead Industries, Ltd. Ord. (10/-)	13/1½	13/1½
,, 7% Prefd. Ord. (10/-)	13/1½	13/1½
,, 7% Cum. Pref.	30/-	30/-
Gossage, William, & Sons, Ltd., 5% 1st Cum. Pref.	24/4½	24/4½
,, 6½% Cum. Pref.	28/9	30/-
Imperial Chemical Industries, Ltd. Ord.	35/3	34/9
,, Deferred (10/-)	8/6	8/6
,, 7% Cum. Pref.	32/6	32/3
Imperial Smelting Corporation, Ltd. Ord.	15/6	15/6
,, 6½% Pref. (Cum.)	24/3	24/3
International Nickel Co. of Canada, Ltd. Cum.	$31¾	$32
Johnson, Matthey & Co., Ltd. 5% Cum. Pref. (£5)	105/-	105/-
,, 4% Mort. Deb. Red. (£100)	£98/10/-	£98/10/-
Laporte, B., Ltd. Ord.	116/3	110/-
Lawes Chemical Co., Ltd. Ord. (1/-)	6/3	6/3
,, 7% Non-Cum. Part Pref. (10/-)	10/-	10/-
Lever Bros., Ltd. 7% Cum. Pref.	31/3	30/6
,, 8% Cum. "A" Pref.	31/3	31/-
,, 20% Cum. Prefd. Ord.	76/10½	76/10½
,, 5% Cons. Deb. (£100)	£106	£106
,, 4% Cons. Deb. (£100)	£103	£103
Magadi Soda Co., Ltd. 12½% Pref. Ord. (5/-)	1/3	1/3
,, 6% 2nd Pref. (5/-)	6d.	6d.
,, 6% 1st Debs. (Reg.)	£10	£10
Major & Co., Ltd. Ord. (5/-)	4½d.	7½d.
,, 8% Part. Prefd. Ord. (10/-)	9d.	9d.
,, 7½% Cum. Pref.	11¼d.	11¼d.
Pinchin, Johnson & Co., Ltd. Ord. (10/-)	42/-	42/-
,, 1st Pref. 6½% Cum.	30/-	30/-
Potash Syndicate of Germany (Deutsches Kalisyndikat G.m.b.H.) 7% Gld. Ln. Sr. "A" and "B" Rd.	£68/10/-	£67/10/-
Reckitt & Sons, Ltd. Ord.	108/1½	108/1½
,, 4½% Cum. 1st Pref.	25/-	25/-
Salt Union, Ltd. Ord.	40/-	40/-
,, Pref.	46/3	46/3
,, 4½ Deb. (£100)	£109/10/-	£109/10/-
South Metropolitan Gas Co. Ord. (£100)	£123/10/-	£122/10/-
,, 6% Irred. Pref. (£100)	£149/10/-	£149/10/-
,, 4% Pref. (Irred.) (£100)	£107	£107
,, Perpetual 3% Deb. (£100)	£85	£86
,, 5% Red. Deb. 1950-60 (£100)	£115/10/-	£115/10/-
Staveley Coal & Iron Co., Ltd. Ord.	46/3	47/6
Stevenson & Howell, Ltd. 6¼% Cum. Pref.	27/6	26/3
Triplex Safety Glass Co., Ltd. Ord. (10/-)	76/10½	73/1½
Unilever, Ltd. Ord.	30/-	28/9
,, 7% Cum. Pref.	27/9	27/9
United Glass Bottle Manufacturers, Ltd. Ord.	39/6	39/-
,, 7½% Cum. Pref.	33/-	33/-
United Molasses Co., Ltd Ord. (6/8)	18/9	18/9
,, 6% Cum. Pref.	25/-	25/-
United Premier Oil & Cake Co., Ltd. Ord. (5/-)	7/6	7/6
,, 7% Cum. Pref.	24/4½	24/4½
,, 6% Deb. Red. (£100)	£101	£101

Weekly Prices of British Chemical Products

Review of Current Market Conditions

PRICES of a number of coal tar products have been advanced during the week, and there have also been slight increases in a few pharmaceutical and photographic materials and essential oils. Heavy chemicals, rubber chemicals, wood distillation products, perfumery chemicals and intermediates remain unchanged. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works.

LONDON.—There is quite a good demand in all directions with prices firm with a few exceptions. In the coal tar products market conditions remain steady and there are no changes to report from last week.

MANCHESTER.—Trading generally has been on a moderately active scale on the Manchester chemical market during the past week. Interest in contract commitments over the whole or part of next year is expected to show improvement in the near future, and the general opinion on this market is that little change in basic prices compared with those now ruling will be made. In any event, it seems to be pretty certain that any alterations will be upward rather than downward. Conditions in the cotton textile trade continue to show some improvement and deliveries of chemical products for dyeing, finishing and other purposes are well maintained, with a slight expansion reported in one or two directions. The light sections of the by-products market remain fairly active centres, but for the time being the rise in prices seems to have been halted, although the tendency is still quite firm.

SCOTLAND.—There has been an improved demand for chemicals for home trade, but export inquiries remain very limited. Prices generally continue steady at about previous figures with only slight alterations to report.

Price Changes

Coal Tar Products.—ACID CRESYLIC, 99/100, 1s. 9d. to 2s. 3d. per gal.; pale, 98%, 1s. 6d. to 1s. 8d.; dark, 1s. 2d. to 1s. 3d.; NAPHTHA, solvent, 90/160, 1s. 5½d. to 1s. 6½d. NAPHTHALENE, crude, whizzed or hot pressed, £9 per ton; XYLOL, 2s. 1d. to 2s. 2d. per gal.

Pharmaceutical and Photographic Materials.—SEIDLITZ POWDER (pulv.), 62s. 6d. to 66s. 3d. per cwt.; SOD. POTASS. TARTRATE (Rochelle salt), 75s.

Essential Oils.—CITRONELLA OIL, Java, 1s. 6d. per lb.; LAVENDER, Mont Blanc, 38/40%, 32s.; LEMON, 8s. 6d.

All other prices remain unchanged.

General Chemicals

ACETONE.—LONDON: £62 to £65 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80%, £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech., 80%, £38 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. SCOTLAND: Crystals, £26 10s.; powder, £27 10s.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—11¾d. per lb. MANCHESTER: 1s. SCOTLAND: 11¾d.

ACID, CRESYLIC.—97/100%, 1s. 5d. to 1s. 6d. per gal.; 99/100%, refined, 1s. 9d. to 1s. 10d. per gal. LONDON: 98/100%, 1s. 5d. f.o.r.; dark, 1s.

ACID, FORMIC.—LONDON: £40 to £45 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £55 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. LONDON: 11½d., less 5%. SCOTLAND: 1s. 0¼d. less 5%. MANCHESTER: 1s. per lb.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £34 per ton, c.i.f. U.K ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £15 per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £22, ex store

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—LONDON: £10 10s. per ton. SCOTLAND: £10 10s. to £10 15s.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £9 5s.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—4s. 10d. to 5s. 1d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¾d. per lb. LONDON: 4¼d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3¼d. per lb.; liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 16s. 6d. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £25 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£45 to £48 per ton.

LEAD, ACETATE.—LONDON: White, £36 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £37; brown, £34.

LEAD NITRATE.—£32 10s. to £34 10s. per ton.

LEAD, RED.—SCOTLAND: £25 to £27 per ton less 2½%; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £42 10s.

LITHOPONE.—30%, £16 10s. to £17 10s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

PHENOL.—6¾d. to 7¾d. per lb. to June 30, 1936.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5%, d/d U.K. Ground, 5¼d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6¼d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. crystals, 10d. to 10½d. MANCHESTER: B P., 1s.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 8½d. to 8¾d. per lb.

SCOTLAND: Yellow spot, 8¼d. ex store. MANCHESTER: Yellow, 8¼d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £36.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—LONDON: £21 10s. SCOTLAND: £20 15s.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. LONDON: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. basis. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 10s. per ton. SCOTLAND: 3⅜d. per lb.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £14 10s.

SODIUM META SILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 5½d.

SODIUM SILICATE.—140° Tw. Spot, £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material, £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 2s. 6d.

SODIUM SULPHITE.—Pea crystals, spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHUR.—£9 10s. to £9 15s. per ton. SCOTLAND: £8 to £9.

SULPHATE OF COPPER.—MANCHESTER: £14 12s. 6d. per ton f.o.b.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 4s. 8d. per lb. in 1-cwt. lots.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINZ SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—10d. to 11d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 6¾d. to 7½d. per lb.; crude, 60's, 1s. 11½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7d. to 7¼d. per lb.; crude, 2s. 2d. per gal. SCOTLAND: 60's, 2s 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 9d. to 2s. 3d. per gal., according to specification; pale 98%, 1s. 6d. to 1s. 7d; dark, 1s. 2d. to 1s. 3d.. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s 1d.; high boiling acid, 2s. 6d. to 3s.

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 3½d. SCOTLAND: Motor, 1s. 6½d.

CREOSOTE.—B.S.I. Specification standard, 6d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 5½d. to 5¾d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4½d.; heavy, 4¼d. to 4½d.

NAPHTHA.—Solvent, 90/100%, 1s. 5½d. to 1s. 6½d. per gal.; 95/100%, 1s. 6d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £9 per ton; purified crystals, £11 per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PYRIDINE.—90/140%, 5s. 3d. to 8s. per gal.; 90/180, 2s. 3d.

TOLUOL.—90%, 2s. to 2s. 1d. per gal.; pure, 2s. 4d. to 2s. 5d.

XYLOL.—Commercial, 2s. 1d. to 2s. 2d. per gal.; pure, 2s. 3d. to 2s. 4d.

PITCH.—Medium, soft, 32s. 6d. per ton, in bulk at makers' works.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 to £9. Grey, £11. Liquor, brown, 30° Tw., 8d. per gal. MANCHESTER: Brown, £9 10s.; grey £11 10s.

CHARCOAL.—£4 15s. to £10 per ton, according to grade and locality.

METHYL ACETONE.—40-50%, £43 to £46 per ton.

WOOD CREOSOTE.—Unrefined, 3d. to 1s. 3d. per gal.

WOOD NAPHTHA, MISCIBLE.—2s. 6d. to 3s. 6d. per gal.; solvent, 3s. 3d. to 4s. 3d. per gal.

WOOD TAR.—£2 to £2 10s. per ton.

Latest Oil Prices

LONDON, Oct. 23.—LINSEED OIL was easy. Spot, £27 10s. per ton (small quantities); Nov., £25 2s. 6d.; Dec., £25 5s.; Jan.-April, £25 7s. 6d.; May-Aug., £25 12s. 6d., naked. SOYA BEAN OIL was quiet. Oriental (bulk), Oct.-Nov. shipment, £23 10s. per ton. RAPE OIL was steady. Crude, extracted, £36 10s. per ton; technical, refined, £38, naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £25 10s. per ton; refined common edible, £30; and deodorised, £32, naked, ex mill; small lots, £1 10s. extra. TURPENTINE was steady. American, spot, 48s. 3d. per cwt.

HULL.—LINSEED OIL.—Spot quoted £26 per ton; Oct. and Nov.-Dec., £25 10s.; Jan.-April, £25 12s. 6d.; May-Aug., £25 15s. COTTON OIL.—Egyptian, crude, spot, £26 10s. per ton; edible, refined, spot, £29 10s.; technical, spot, £29 10s.; deodorised, £31 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £24 per ton, naked. GROUNDNUT OIL.—Extracted, spot, £35 per ton; deodorised, £38. RAPE OIL.—Extracted, spot, £35 10s. per ton; refined, £37. SOYA OIL.—Extracted, spot, £28 10s. per ton; deodorised, £31 10s. COD OIL, f.o.r. or f.a.s., 25s. per cwt. in barrels. CASTOR OIL.—Pharmaceutical, 45s.; firsts, 40s.; seconds, 38s. per cwt. TURPENTINE, American, spot, 50s. 3d. per cwt.

New Companies Registered

Atlantic Chemicals, Ltd., 18 Austin Friars, E.C.—Registered October 12. Nominal capital £5,000. Objects: To carry on the business of merchants, manufacturers, transporters and distributors of and dealers in chemicals, chemical products of all descriptions, solvents, petroleum, kerosene, benzine, gas, lubricating oil, fuel oil, and other oils, waxes, greases and all products made from coal or from coal and oils, motor car and aeroplane manufacturers and dealers, etc. A subscriber: J. G. Beevor, 18 Austin Friars, E.C.

K. Beugger & Co., Ltd., The Bungalow, Gillingham Green, Gillingham, Kent.—Registered October 17. Nominal capital £100. Objects: To carry on the business of manufacturers of and dealers in chemicals, gases, drugs, medicines, etc. Directors: Knud J. A. Beugger, John H. Beugger.

Chemical Preparations, Ltd., 8 Parr Street, Liverpool.—Registered October 14. Nominal capital £100. Objects: To acquire the sole rights to manufacture and market in Great Britain certain proprietary makes of chemical preparations and other foreign agencies carried on by Bradley Bryan at 40 Fenwick Street, Liverpool, as "Bradley Bryan & Co." Directors are: Bradley Bryan, Edmund W. Lancaster, Robt. W. Faulkner.

Irish Oil Corporation, Ltd., 57-58 Chancery Lane, London, W.C.2.—Registered in Dublin, October 14. Nominal capital £1,000. Makers and dealers in turpentine and any substitutes thereof, oils and petroleum, chemicals of all kinds, etc. Directors: William W. Clark, Sidney Atkinson, Ernest Cullen, Peter A. Corrigan.

Pension Funds Securities, Ltd., Imperial Chemical House, Millbank, S.W.1.—Registered October 21. Nominal capital of £100. Objects: To act as trustees, nominees or agents; to acquire and hold shares, stocks, debentures and other securities, etc. Directors: John E. James, Lord Melchett, Harold J. Mitchell, John G. Nicholson, John Rogers, Benjamin E. Todhunter, Lt.-Col. George P. Pollit, and five others, being departmental managers, officials or employees of Imperial Chemical Industries, Ltd.

Prophyll Co., Ltd., Rutbourne Road, Pulborough.—Registered October 18. Nominal capital £1,000. Manufacturers of and dealers in nose and throat and other sprays, chemicals, gases, drugs, medicines, etc. Directors: Wm. G. Stewart, Wm. H. Hingston and Geo. M. G. Jones.

Sunshine Products, Ltd., 65 Great Strand Street, Dublin.—Private company. Registered in Dublin October 7. Nominal capital £1,000. Objects: To carry on the business of manufacturers, bottlers, and distributors of sodium, hypochloride, ammonia, etc. Directors: Robert Y. Kennedy, Bernard C. Parr.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Complete Specifications open to Public Inspection

VIOLET-TO-BLUE DYEING DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. April 14, 1934. 9847/35.

GLYCOL ESTER DERIVATIVES.—Carbide and Carbon Chemicals Corporation. April 11, 1934. 9935/35.

CELLULOSE DERIVATIVES, process for the manufacture.—British Celanese, Ltd. April 10, 1934. 10347/35.

1 : 2-DIAMINOBENZENE, manufacture.—Soc. of Chemical Industry in Basle. April 12, 1934. 10486/35.

MONOAZO DYESTUFFS insoluble in water, manufacture.—J. R. Geigy A.-G. April 9, 1934. 10595/35.

INSOLUBLE DISAZO DYESTUFFS of the benzidine series, manufacture.—J. R. Geigy A.-G. April 9, 1934. 10576/35.

DISAZO DYESTUFFS, manufacture.—J. R. Geigy A.-G. April 12, 1934. 10597/35.

HALOGENATED ETHERS, manufacture and production.—I. G. Farbenindustrie. April 10, 1934. 10929/35.

NITROCELLULOSE COMPOSITIONS.—British Thomson-Houston Co., Ltd. April 14, 1934. 11128-9/35.

ACID DYESTUFFS of the anthraquinone series, manufacture.—I. G. Farbenindustrie. April 11, 1934. 11246/35.

ESTERS, process for manufacture.—Celluloid Corporation. April 13, 1934. 11500/35.

ESTERS OF PHENOLALDEHYDE RESINS, process of producing.—H. T. Bucherer. April 13, 1934. 11521/35.

GLUTAMINE, manufacture and production.—I. G. Farbenindustrie. April 14, 1934. 11592/35.

FLUX FOR CADMIUM and its alloys.—American Smelting and Refining Co. April 14, 1934. 11619/35.

Specifications Accepted with Date of Application

SULPHONIC ACID and carboxylic acid derivatives of 1 :3-diaryl-5-pyrazolones, manufacture.—I. G. Farbenindustrie. March 3, 1933. 436,516.

AMINES, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). March 28, 1934. 436,214.

PROCESSES FOR PURIFYING GASES containing hydrogen sulphide from hydrogen sulphide.—G. H. Hultman and C.-W. Pilo. April 7, 1933. 436,218.

RECOVERY OF ACID GASES, process and apparatus.—G. J. Horvitz. Feb. 28, 1934. 436,220.

WATER-INSOLUBLE AZO DYESTUFFS on the fibre, process for manufacture.—A. Carpmael (I. G. Farbenindustrie). April 3, 1934. 436,371.

RECOVERY OF AMMONIA AND AMINES from their salts with organic acids.—British Celanese, Ltd., H. F. Oxley, E. B. Thomas, and H. Dreyfus. April 4, 1934. 436,224.

AMMONIUM NITRATE EXPLOSIVES.—Imperial Chemical Industries, Ltd. April 7, 1933. 436,302.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. April 15, 1933. 436,390.

NAPHTHYLAMINESULPHONIC ACIDS, manufacture.—E. I. du Pont de Nemours and Co. April 11, 1933. 436,464.

INDIGOID VAT DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). July 18, 1934. 436,322.

TERTIARY AMINES of high molecular weight, manufacture and production.—I. G. Farbenindustrie. Sept 16, 1933. 436,414.

ALKALI ORTHOPHOSPHATES, production.—Kali-Forschungs-Anstalt Ges. Dec. 9, 1933. 436,335.

ALKYLENES, preparation.—H. T. Bohme A.-G. March 17, 1934. 436,345.

UNSATURATED POLYHALIDES, treatment.—Naamlooze Vennootschap de Battafsche Petroleum Maatschappij. April 28, 1934. 436,357.

Applications for Patents

(September 26 to October 2 inclusive).

RECOVERY OF ISOBUTYLENE from hydrocarbon mixtures.—I. G. Farbenindustrie. (Germany, Oct. 3, '34.) 26956.

LIQUID HYDROCARBONS, manufacture.—I. G. Farbenindustrie. 26957.

ARTIFICIAL RESINS, manufacture.—Imperial Chemical Industries, Ltd. (Italy, Sept. 29, '34.) 26780.

DISTILLATION GASES, purification.—G. W. Johnson (I. G. Farbenindustrie). 26624.

METAL CARBONYLS, manufacture.—G. W. Johnson (I. G. Farbenindustrie). 26648.

POTASSIUM CARBONATE, production.—Kali-Chemie A.-G. (Germany, Aug. 29.) 27120.

MONOALKYLOLAMINES, production.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, Oct. 1, '34.) 26674.

CARBOXYLIC COMPOUNDS, producing.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, Oct. 8, '34.) 26816.

POLYVINYL RESINS, production.—H. E. Potts (Shawinigan Chemicals, Ltd.). 26637.

ORGANIC MERCURY COMPOUNDS, manufacture.—Schering-Kahlbaum A.-G. (Germany, Sept. 29, '34.) 27012.

MAKING POLYESTER COMPOUNDS.—Standard Oil Development Co. (United States, Oct. 25, '34.) 27234.

ESTERS OF CARBOCYCLIC ACIDS, ETC.—R. E. Thomas. 27087.

(October 3 to 9 inclusive.)

ARTIFICIAL RESINOUS PRODUCTS.—Beck, Koller and Co. (England), Ltd. (Germany, Oct. 10, '34.) 27898.

AMINO-M-PHENANTHROLINES, preparing.—U. G. Bijlsma and J. Böeseken. 27266, 27267.

ALDEHYDE CONDENSATION PRODUCTS, manufacture.—A. G. Bloxam (Soc. of Chemical Industry in Basle). 27763.

MAGNESIUM, ETC., purification.—Briske and Prohl and A. Luschenowsky. 27686.

ORGANIC SUBSTANCES, manufacture.—British Celanese, Ltd., R. W. Moncrieff and C. W. North. 27558.

ALIPHATIC COMPOUNDS, concentration.—British Celanese, Ltd. (United States, Oct. 5, '34.) 27641.

DIALKYL ETHERS OF GLYCOL, preparation.—Carbide and Carbon Chemicals Corporation. (United States, Nov. 9, '34.) 27731.

AZO DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 27576.

DERIVATIVES OF ARYLIDES of aromatic hydroxycarboxylic acids, manufacture.—A. Carpmael (I. G. Farbenindustrie). 27803.

UREA RESIN enclosing solid object.—Chugoku Toryo Kabuschiki Kaisha. (Japan, July 20.) 27496.

DIACETYL, manufacture.—Coutts and Co. (I. G. Farbenindustrie). 27480.

AMINES, manufacture.—E. I. du Pont de Nemours and Co. 27691.

Forthcoming Events

LONDON.

Oct. 30.—Electrodepositors' Technical Society. "Electrodeposition of Bronze." C. Bechard. "Some Tests on Bronze Deposits." S. Baier. 8.15 p.m. Northampton Polytechnic Institute, St. John Street, Clerkenwell, London.

Nov. 1.—Royal Institution of Great Britain. "The Liberation of the Electron; Its Industrial Consequences." Clifford C. Paterson. 9 p.m. 21 Albemarle Street, London, W.1.

BANGOR.

Nov. 1.—The Chemical Society. "Thermodynamics and Reaction Velocity." Professor M. Polanyi. 5.30 p.m. Chemistry Lecture Theatre, University College, Bangor, North Wales.

BRISTOL.

Oct. 28.—University of Bristol. Recent Advances in Catalysis. Dr. E. B. Maxted. Lecture 2. The Properties of Catalytically Active Surfaces. 5.15 p.m. University, Bristol.

CARDIFF.

Oct. 31.—Society of Chemical Industry (South Wales Section). Joint Meeting with Institute of Chemistry. "Some Aspects of Oxidation and Reduction." Professor Henry Bassett. 7.30 p.m. University College, Cardiff.

GLASGOW.

Nov. 1.—Society of Chemical Industry (Glasgow Section). "Colloid and Crystal Growth." F. D. Miles. 7.30 p.m. Royal Technical College, Glasgow.

HULL.

Oct. 29.—Hull Chemical and Engineering Society. Film and Lecture. "The Beetle Film." N. Bond. 7.45 p.m. Municipal Technical College, Park Street, Hull.

MANCHESTER.

Nov. 1.—Society of Dyers and Colourists. Annual conjoint meeting of Manchester Societies. "Starch, Cellulose and Related Carbohydrates." Professor W. N. Haworth. Central Library, St. Peter's Square, Manchester.

NEWCASTLE-ON-TYNE.

Nov. 1.—The University of Durham Philosophical Society. "The Chemical Nature of Vitamins." Dr. E. L. Hirst. 6.30 p.m. Armstrong College, Newcastle-on-Tyne.

From Week to Week

WILLIAM HALL AND CO. (MONSALL), LTD., dyers, bleachers, and printers, of Newton Heath, have taken over the mill of Peel and Co. (Stalybridge), at Pendleton.

THE UPHALL WORKS MAGAZINE has just been published. It is devoted entirely to the doings of the staff of Howards and Sons, Ltd., and contains a variety of entertaining matter.

THE "PROCEEDINGS OF THE INDIAN ACADEMY OF SCIENCE" for September has just been published. Amongst several good articles "Fluorescence in Cyclobetane," by R. Padmanabhan, is outstanding.

THE BRITISH DRUG HOUSES, LTD., have published a fourth revised and enlarged edition of their booklet, "*p*H Values: What they are and how to determine them." There has been a persistent demand for the earlier editions of this booklet, which have been distributed, free of charge, to laboratory workers and students.

CONTRACTS HAVE BEEN PLACED with the Whessoe Foundry and Engineering Co., Ltd., Darlington, and Grant and Livingston, Ilford, by the Shell-Mex and British Petroleum Co., Ltd., for the erection of a storage tank for 1,500 gal. of petroleum spirit at Jarrow. The work will take over four months and provide employment for local men.

THE JAPANESE CONSUL GENERAL in Sydney has informed his Government that the Australian Government has prohibited the import of certain Japanese toys into Australia, alleging that they are coloured with harmful dyes. Included among the "undesirable toys" imported into Sydney were celluloid and rubber toys and crayons of which the colouring was reported to contain lead and arsenic.

PROFESSOR HAKON LUND, of Aarhus University, Copenhagen, has discovered a new explosive substance more effective than dynamite. Five grams were buried in a deep hole in the ground as an experiment and ignited. A tremendous explosion occurred, and the earth was torn up for many yards around. Officers of the Danish Army are taking a great interest in the new explosive. Larger quantities of the explosive will now be made in the university for further experiments.

SIR HENRY DALE, director of the National Institute for Medical Research, delivering the Harveian Oration at the Royal College of Physicians, on October 18, said that the most general characteristic of the present epoch seemed to be the growing dominance of chemical ideas and the success of chemical methods. Many hormones and vitamins, the very existence of which a few years ago was merely a matter of indirect presumption, had been isolated, chemically identified, and even prepared by artificial synthesis. In immunology, embryology, and in the physiology of muscular activity and nervous transmission the methods and conceptions of exact chemistry were finding a rapidly growing application.

PREPARATIONS ARE BEING MADE for the working of a new shale seam at Burngrange, West Calder. Scottish Oils, Ltd., have been engaged for some time in sinking two shafts, the object being to reach the Dunnet seam, which so far has not been worked to any great extent. It is understood there is a large deposit in the district. The pithead frames have now been completed, and sinking operations have reached the shale at a depth of 75 fathoms. A further development is the erection of a new power station at the Addiewell Oil Works. When this is completed it is believed that a new era will be opened for the shale oil industry in the West Calder district.

BIRKBECK COLLEGE is to find a new home. Soon it will move from fifty-year-old buildings off Chancery Lane, to Bloomsbury, which is rapidly becoming a centre of learning. The University of London, of which the College is part, has allotted a portion of its site, and from the University, London County Council and other sources £85,000 has been obtained for building. The cost of the new college is estimated at something between £225,000 and £250,000. Early next month a public appeal will be launched at the Mansion House. The Lord Mayor, who will preside, is an old student of the College and now a member of its Governing Body. Another speaker at this meeting will be Mr. Ramsay MacDonald, also an old student. The Duke of York has promised to be present, and the appeal will have further support from the Archbishop of Canterbury.

THE IMPORT DUTIES ADVISORY COMMITTEE has received applications for drawback under Section 9 of the Finance Act, 1932, in respect of soya beans used in the manufacture of soya bean flour by a process in which the beans are decorticated, but the oil is not expressed or extracted, and soya beans used in the manufacture of soya bean oil, but not including hydrogenated soya bean oil and mixture of soya bean oil with other oils. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than October 31. The committee has decided not to make any recommendation in connection with applications for an increase in the import duty on opal glass bottles and jars, and for the reduction of the import duty on laminboard, blockboard and battenboard cores.

THE HOCKLEY CHEMICAL CO., LTD., Birmingham, has changed its name to Hoklykem, Ltd.

IN THE CHANCERY DIVISION on Thursday afternoon, Mr. Justice Eve fixed November 5 for the further hearing of the petition by Imperial Chemical Industries, Ltd., for the reduction of its capital from £95,000,000 to £89,565,899. The petition is opposed by a number of shareholders.

A REPRESENTATION HAS BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926 (Key Industry Duty) regarding pseudo-cumenol. Any communication should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, before November 6.

THE ANNUAL MEETING of the Science Masters' Association will be held in the Chemistry Department of the Imperial College of Science and Technology, South Kensington, from January 1 to 4, 1936. The membership of the Association is nearly 2,000, about 750 schools being represented. At least 500 members are expected to attend the meeting.

THE PROMPTITUDE OF GLASGOW FIREMEN limited a serious outbreak of fire in the furnace-room of Stewarts and Lloyds, Ltd., tube works, Glasgow. When the firemen arrived they found flames several feet high coming from a 60-gal. oil tank which had caught fire. As it was impossible to put out the fire by ordinary means, the firemen drained off the burning oil which exhausted itself on the surface.

THE HOME SECRETARY is to be asked to give statutory effect to new rules which have been drawn up as a precaution against kier accidents in bleaching and dyeing works. The rules are the outcome of an accident at Higher Blackley, Manchester, last year, when four boys, while working inside a kier (a large enclosed tank used in the bleaching, dyeing, and similar industries) were scalded to death by hot liquor inadvertently admitted into the kier by a fellow operative.

THE CHEMICAL SECTION at the 1936 British Industries Fair which opens on February 17, will be larger than last year, and the display will comprise a comprehensive range of chemicals for all purposes. There will be an imposing display of the chemicals used in big industry, and of tar and chemical products, and the goods produced by the manufacturing chemist will provide a more domestic interest. Among these is an inhalent which it is claimed will cure influenza and the common cold in the early stages.

THE SWEDISH GOVERNMENT decided on October 18 to prohibit the export of war materials to Italy and to lift the ban on the export of war materials to Abyssinia. Signor Marinotti, a representative of the Snia Viscosa Co. has arrived there on a visit to the Billeruds Co.'s works. The Billeruds Co. is a large producer of rayon cellulose and supplies sulphite cellulose for artificial silk to the Snia Viscosa Co. Although Signor Marinotti has refused to disclose the real purpose of his visit, it is believed that the object is to discuss the possibilities of continuing supplies in the event of Sweden prohibiting credits to Italy.

PREPARATIONS ARE GOING FORWARD for the resumption of work at Nentsbury and Rotherhope lead and zinc mines in Alston Moor, Cumberland. They are owned by the Vieille Montague Zinc Co. It is understood that increased production in Nentsbury, where a skeleton staff has been employed mainly on a maintenance basis since September, 1934, will begin immediately, and that at Rotherhope the mine and mill will be operating one shift per day by December and two shifts in January. It seems likely that 150 miners and mill men will be required in January, and if the prices of lead and zinc remain as at present more men will be required early next year.

CANADA'S SALES OF GYPSUM last year totalled 461,237 tons, as compared with 380,234 tons in 1933, whilst the value rose from $663,312 to $863,776. The quantity of gypsum actually mined or quarried rose during the year from 370,691 tons to 493,295 tons, whilst the quantity calcined was up from 44,086 tons to 74,356 tons. The 1934 output came from the provinces of Nova Scotia, New Brunswick, Ontario, Manitoba and British Columbia, in each of which increases in tonnage and value were recorded. The Canadian gypsum industry is benefiting from the increasing tendency to make buildings as nearly fireproof as possible, whilst special insulating plasters and sound-deadening plasters and other products have been developed and are finding a ready market.

THE CHINA CLAY SHIPMENTS for September month, whilst they were nearly 10,000 tons less than those recorded the previous month, are very satisfactory, as they are over 10,000 tons above the tonnage despatched in September, 1934. Details are as under: Fowey, 38,793 tons of china clay (compared with 31,533 tons in 1934), 1,708 tons china stone, 3,160 tons ball clay; Par, 6,274 tons china clay, 1,051 tons china stone; Charlestown, 3,297 tons china clay, 813 tons china stone; Penzance, 414 tons china clay; Padstow 327 tons china clay; Plymouth, 231 tons china clay; Newham, 72 tons china clay; traffic entirely by rail, 5,387 tons china clay. Totals are: 54,795 tons china clay, 3,572 tons of china stone, 3,160 tons ball clay, compared with 64,195 tons of china clay, 2,932 tons china stone and 1,791 tons ball clay in August.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

AGDEN SALT WORKS (1935), LTD., London, E. (M., 26/10/35.) Reg. Oct. 11, mort., to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land and buildings at Lymm, etc.

BRITISH SILK DYEING CO., LTD., London, E.C. (M., 26/10/35.) Reg. Oct. 14, £100,000 debs.; general charge (excluding certain land and buildings at Bonhill). *£100,000. Dec. 25, 1934.

SPENCER, HAYES AND CO., LTD., Birmingham, mfrs. of chemicals, etc. (M., 26/10/35.) Reg. Oct. 10, £400 deb., to H. Worrall, 45 Beakshill Road, Kings Norton; general charge.

Satisfactions

BRITANNIA LEAD CO., LTD., London, E.C. (M.S., 26/10/35.) Satisfaction reg. Oct. 9, of charge reg. Dec. 21, 1934.

BRITISH SILK DYEING CO., LTD., London, E.C. (M.S., 26/10/35.) Satisfactions reg. Oct. 14, of deb. stock and disposition reg. Oct. 29 and Nov. 11, 1930.

Companies Winding-up Voluntarily

BRITISH TITANIUM CO., LTD. (C.W.U.V., 26/10/35.) Creditors' debts or claims by November 18 to James Rochester, London House, 3 New London Street, E.C.3, the liquidator of the company.

Voluntary Liquidation

BRITISH OIL REFINERS, LTD., late of York Terrace, Baker Street, London, W. The statutory meeting of creditors was held on October 22 at the offices of Thorne, Lancaster, Farey, Reacher and Collett, Basinghall Street, when it was reported that the shareholders had already passed resolutions putting the company into voluntary liquidation and had nominated Mr. M. W. H. Lancaster as liquidator. The statement of affairs showed ranking liabilities of £1,163 10s. 1d., due to trade and expense creditors. The assets consisted of cash at bank and in hand £51 16s. 1d.; and book debts and deposits £154 13s. 8d., estimated to realise £139 12s. 8d., making a total of £191 8s. 9d. After allowing £161 5s. 0d. for preferential claims the net assets were £90 3s. 9d., or a deficiency, so far as the creditors were concerned, of £1,073 6s. 4d. The nominal capital of the company was £3,700, divided into 3,700 shares of the face value of £1 each. The issued capital was £3,450, fully paid. The company had carried on business for a number of years at the above address. When voluntary liquidation was decided upon the premises were vacated. Practically the whole of the liabilities were due to expense creditors, the trade creditors having been paid when their accounts fell due, and the amount owing for goods supplied was negligible. The company had traded with retailers in the metropolitan district, and had refined oil at York Terrace. A resolution was passed confirming the voluntary liquidation of the company with Mr. Lancaster as liquidator.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Denmark.—A firm of agents established at Copenhagen wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of stainless steel in sheets. (Ref. 375.)

Company News

Splintex Safety Glass.—The report for the year to June 30 last shows debit balance brought in £46,575; to this is added £1,912 loss sustained in respect of plant, equipment and lease of factory purchased from Newtex Safety Glass Co., making £48,487, after deducting the net profit of £867 for the year, there is a debit of £47,621 to be carried forward.

Tecalemit, Ltd.—The first report covering the period December to July 31 last states that after charging expenses and providing for bad and doubtful debts the profit is £53,687. Depreciation absorbs £4,557 and £225 is written off leasehold property. The proportion of net profit, after charging depreciation and tax, applicable to the period prior to the incorporation of the company amounts to £5,620, and this has been transferred to capital reserve. A sum of £6,500—equal to one-half—is written off preliminary expenses and £4,380 off patents, licences and designs. After allowing £13,000 for tax there is an available balance of £19,405. A dividend for the period is to be paid at the rate of 12 per cent. per annum, together with a cash bonus at the rate of 2 per cent. per annum. This will require £13,793, leaving £5,611 to be carried forward, subject to directors' remuneration.

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